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A REVISIONAL STUDY OF THE FOSSIL SYRPHIDAE

By Frank Montgomery Hull
University of Mississippi

With Thirteen Plates

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INTRODUCTION AND ACKNOWLEDGEMENTS

Although many fossil Syrphidae have been described during the past century, no one has attempted a comprehensive treatment of them. The specific details within this family are often obscure, and a study of this kind is needed in order to relate the fossil species to the Recent genera. This effort toward a revision of the fossil Syrphids began with a study of the excellent collection in the Museum of Comparative Zoölogy at Harvard University. I am indebted to Dr. F. M. Carpenter and Dr. C. T. Brues for the suggestion that a study of the fossil Syrphids might be replete with interest, and furnish some insight into the phylogenetic history of the group. I wish further to thank Dr. Carpenter for neverfailing advice of many kinds, for much discussion and encouragement. Besides allowing me to examine the very unusual collections of the Museum of Comparative Zoölogy, he has secured the loan of a number of types, all of which made this study possible. In addition, I am deeply indebted to Dr. C. T. Brues for many kindnesses and much advice. To Professor Nathan Banks I owe much thanks for helpful suggestions and for permitting me access to

important collections in which I found representatives of fully half of the living genera.

My thanks are due to Dr. E. A. Chapin of the U. S. National Museum and the late Dr. F. E. Lutz of the American Museum, not only for the loan of material but for placing facilities for study before me in visits to their institutions; to Professor T. D. A. Cockerell of the University of Colorado for the loan of types from the university collections; and to Dr. A. L. Melander of the College of the City of New York for the loan of material.

Early in this investigation it became apparent that it would be advisable to study the amber Syrphidae in the university museum at Konigsberg. This was made possible by a grant from the Penrose Fund of the American Philosophical Society. Important collections containing rare living genera were studied in Vienna, Berlin, Amsterdam and London. Additional amber material was obtained in two institutions in Berlin, and amber and other material studied from the British Museum. I wish especially to thank Dr. K. Andree, Director of the Geologisch-palaontologisches Institut und Bernsteinsammlung der Albertus-Universität of Konigsberg and his associate Dr. Otto Pratje for kindnesses to me during my visit there and for loan of the material. I wish also to thank the following individuals who materially aided this study by the loan of specimens: Dr. W. Janensch of the Geologisch-Palaontologisches Institut and Museum der Universität Berlin; Dr. J. V. Wumdorf, Preussische Geologische Landesanstalt in Berlin; Mr. T. H. Withers, Department of Geology, British Museum of Natural History; and Dr. G. D. H. Carpenter, University Museum of Oxford University, England.

PREVIOUS WORK ON FOSSIL SYRPHIDAE

The earliest reference to a fossil Syrphid fly in the literature is of an unidentified species of *Microdon* listed by Serres in 1829 from the beds of Aix in Provence, France. In 1837 Germar studied the "carbonum fossils" from the Oligocene of Bonn, including one poorly preserved Syrphid, which he called *Helophilus? primarius*. Brodie (1845–47) is erroneously credited by compilers with having figured a Syrphid, which Giebel later (1856) described under the family Muscidae. Weyenberg (1869) described a Syrphid (*Cheilosia dubia*) which must unquestionably be deleted from the lists, since it is totally unrecognizable.

In the middle of the last century three workers devoted much time

to a serious study of fossil insects. The first of these was Hope, who in 1845–47 listed many interesting dipterous genera from Aix in Provence in France, including a specimen of *Rhingia* which has reposed in the Hope collection unnoticed for ninety years. This was recently loaned to me by Dr. G. D. H. Carpenter of the University Museum of Oxford. Oswald Heer, who published in 1849 his "Die Insektenfauna der Tertiargebilde von Oeningen and Radoboj in Croatiens," was the second student of the century to give much attention to fossil insects. Herman Loew in 1850 was the first distinguished dipterist to become interested in fossil Syrphidae. He described no species, but mentioned seven genera from Baltic amber. I was fortunate in finding the material Loew studied in the British Museum, though the *Volucella*, which Loew mentioned and which was the most interesting genus among his material, was missing. It is possible that he had the species I describe below as *Ptilocephala volucelloides* (subfamily Volucellinae) from the collection of the University of Konigsberg. Carl von Heyden (1867) named several species of Syrphids which were taken from the beds of Rott (Siebengebirge in Rheinland). I found one of his types at the British Museum.

In 1877 Samuel Scudder began his notable investigations of the fossil insects of the Green River Shales of Wyoming in this country. These studies appeared at irregular intervals, until as late as 1890, after which Scudder mentions no more Syrphids. Dr. Samuel Williston, about this time, examined certain other specimens of Scudder's and tentatively assigned them to genera. I have confirmed his conclusions in all cases where he mentioned catalogue numbers that have made possible the tracing of the material he handled.

Finally, mention should be made of the work of Professor T. D. A. Cockerell, pioneer enthusiast in the modern study of fossil insects, who has added more species to the list of fossil Syrphidae than any previous writer.

SOURCES OF PRESENT MATERIAL

The specimens upon which this study of fossil Syrphid flies is based are from ten different deposits, including Baltic amber. The Syrphidae preserved in rock are from several collections, the most important of which is in the Museum of Comparative Zoölogy, containing the Scudder collection and the specimens mentioned and discussed by Williston in his 'Synopsis' (1886). All but one of Scudder's five species have been studied. His specimens were from the Green River shales

and excepting one species in the National Museum, they are contained in the collections of the Museum of Comparative Zoölogy. Specimens in the American Museum have been examined and I have likewise been fortunate in studying the types of Dr. Cockerell's fossil Syrphidae, loaned by the University of Colorado Museum. It has therefore been possible for me to see most of the Syrphids from North America. Only one of the fifteen genera and only four of the twenty-five species have not been seen at the time of writing. There are almost twice as many species known from the North American beds as from all of the remaining beds of Europe, not including the specimens from amber.

I have been able to locate but few of the types of fossil Syrphidae from European beds; fortunately, most of these species were described by two men, Heer and Heyden, and they have been carefully illustrated. These illustrations are not of the desirable type, but it is clear that the fossils belong to the subfamily Syrphinae and to the group *Syrphus* in the broad sense. For phylogenetic analysis this can serve my needs. I have studied the types of *Merodon germari* Heyden from Rott (British Museum of Natural History); *Platycheirus infumatus* Heer from Radoboj (British Museum of Natural History); and *Rhingia* Hope from Aix (Hope Museum, Oxford University).

Of the nine Baltic amber genera mentioned in literature, only seven received specific names and therefore numbers, which made them traceable. Of these seven genera I have been able to study five. One of the two named specimens missing is believed to have been mislaid at the University of Konigsberg with the Hymenoptera, having been returned with this family by Dr. Cockerell. The fullest facilities were extended to me at Konigsberg and I was allowed to examine their collection of amber Diptera, which included some ten or twelve thousand specimens and which yielded a total of one hundred and nineteen specimens of Syrphids. Several other collections of amber have yielded new species or old types, chiefly those of the Geologisch-Palaontologisches Institut und Museum der Universitât Berlin, the Preussische Geologische Landesanstalt Museum Berlin, and the British Museum of Natural History. All of these amber collections have furnished a total of twenty new species, making a total of nineteen genera and subgenera and twenty-nine species known from amber.

THE GEOLOGICAL DISTRIBUTION OF THE SYRPHIDAE

Eleven formations, including Baltic amber, have yielded Syrphids; seven of these are in Europe and three are in the United States.

(1) Florissant Shales, Colorado (Miocene)

These shales have yielded an enormous number of beautiful fossils, among which are species of Syrphidae. The fossiliferous character of these shales was discovered by A. C. Peale in 1876. Carpenter (1930) states that only the upper part of the formation bears fossils, and that the preservation was due to the entombing action of volcanic silt and ash. The flora associated with these insects was composed largely of deciduous shrubs and trees and was similar in many ways to that of the upper Cretaceous, with the addition of such genera as *Alnus, Aster, Fraxinus, Populus, Rosa, Rhus, Salix* and *Ulmus.* These are all modern genera of plants and a certain number of well developed flowers are present. *Rosa, Rhus,* and *Salix* present today quite an attraction to Syrphid flies. The climate must have been warm, for magnolias were present. Previous writers have noted the presence of tropical elements in the Florissant fauna, such as *Glossina.*

(2) Creede Shales, Colorado (Miocene)

This rock seems to be a mixture of very fine sand and clay; it had the same origin as the Florissant shales. Only one Syrphid has been taken from this bed thus far. The flora has not yet been fully studied.

(3) Green River Shales, Colorado, Wyoming, Utah (Eocene)

This is the only Eocene bed in this country which has yielded Syrphid flies. It extends over portions of Colorado, Wyoming, and Utah, and has yielded nine species of Syrphidae. The biota includes a very considerable flora and a large number of insects, as well as fish. Although originally regarded as a gigantic lake bed covering thousands of square miles, the deposit is now thought to have been formed by series of numerous small lakes, which were at times saline rather than fresh (Cockerell 1926, Carpenter 1930). As far as can be ascertained, the climate was hot and probably humid. Palms are common in the shales, as well as Fulgorids, which are not abundant in temperate regions.

(4) Oeningen Shales, Germany (Miocene)

This is an old and famous collecting ground for fossil insects, consisting of mixed marls and limestone, mostly thinly laminated; and considered to have been spring-fed lake deposits. Two quarries have

yielded most of the specimens, which include two Syrphid flies. Heer (1849) made a very careful study of the Oeningen fossils.

(5) Marls of Radoboj, Croatia (Miocene)

These deposits are just east of the top of the Adriatic Sea. Unger was the first to give serious attention to their fossils. His work was followed by that of von Charpentier and by that of Heer in 1865. A few Syrphids are included among the three hundred insects described.

(6) Lignite Beds of Rott (Siebengebirge at Bonn, Germany), (Oligocene)

Three species of Syrphidae have been described from these beds. One of these belongs to *Merodon*, a genus which prefers warm climates and whose home is now upon the Mediterranean shores; it confirms the conclusions drawn respecting the climate in Miocene times, which were based upon other species from these beds (Goss, 1878). The authority upon the insects of this region was Carl von Heyden.

(7) Beds of Aix in Provence, France (Oligocene)

This formation, once considered Eocene but now known to be upper Oligocene, is stated by Goss (1878) to include the richest beds of its period on the continent. Marcel de Serres (1829), who was the first to discover insects here, found some eight genera, including two Syrphids, both of great interest. Among later students were Murchison and Lyell (1829); Bonn (1851–6) and the Reverend F. W. Hope (1845–47). In studying the climate in which the biota existed, Saporta (1872) found the flora to be even more southerly than the fauna, a peculiarity which we have noticed for other geological formations in which insects occur. *Microdon* which occurs in these beds is a characteristically tropical genus.

(8) Baltic Amber, Germany (Oligocene)

The Baltic amber is one of our richest sources of fossil insects, and I have been able to study more than a hundred and fifty Syrphid inclusions. Several writers have discussed the environment in which the insects originally lived; the abundance of Psychodidae, Tipulidae, Mycetophilidae, Empididae, and bark-loving Dolichopodids indicate a densely shaded environment.

(9–11) Miscellaneous Occurrences of Fossil Syrphids

One species of a Syrphid was described by Foerster (1891) from Brunstaat in Alsace (middle Oligocene), and another by Stackelberg (1925) from the Miocene of Caucasia. In addition, a Syrphid has been mentioned by Theobald (1934) from Camoins: (Oligocene).

SYSTEMATIC DESCRIPTIONS

Subfamily SYRPHINAE

Syrphus is geologically the oldest Syrphid genus, as far as known. This early occurrence of *Syrphus* agrees with the present concept as to the more generalized of the fourteen subfamilies, which places Syrphinae at the bottom. Three species of the genus are known from the Eocene and all of them certainly appear to belong properly within that genus, at least in the wide sense. It is impossible to determine into which of the existing subgenera they should go, if indeed to any of them.

Pongracz re-allocated two species formerly described in *Syrphus* to the genus *Platycheirus*. He does so on the basis of the wings, but I believe that this must remain a guess on his part, however shrewd, as does my own somewhat conjectural assignment of one species (*persistens*) to *Platycheirus*, until the fore legs are better known from other specimens. *Platycheirus* rests solely on the dilation of the fore tibiae and tarsi in the male. I assign my species (*persistens*) to *Platycheirus* on the form of the tarsi and also upon the basis of the abdominal pattern, which is not always reliable, but sometimes a good indication. Its tarsi appear to be modified. The abdominal pattern is very constant in many Syrphid genera, and in *persistens* it is certainly more like that of *Platycheirus* than of *Syrphus*. The species (*quadrata*) Scudder described as a *Milesia* is obviously out of place and I assign it provisionally to *Asarcina*, an existing African genus. It surely belongs in the Syrphinae, and the pattern is very much like that of *Asarcina* today.

These are the only genera in this subfamily represented by fossils. It is therefore possible that much the greater part of the Recent genera in Syrphinae are merely subgenera and have evolved in somewhat more recent times.

Syrphus aphidopsidis Cockerell

Plate 5, fig. 25

Ann. Ent. Soc. Amer., **2**: 253, fig. 4. (1909)

Female. Length 14.0 mm.; length of wing 9.2 mm. *Head:* is broadly rounded, and the curvature behind suggests that the head was narrowly concave in posterior vertical profile. The head is unusually well preserved, each facet visible, though parts of the surface are cracked away. Front broad, about two-fifths of the head width from the vertical aspect. *Thorax:* and scutellum quite dark and black, the rim of the latter appears more or less truncate apically, but was probably semicircular instead, since the pigment of the abdomen was as dense and dark as that of the scutellum; the demarcation is indistinct. *Abdomen:* of this species is elongate and there is a pattern of transverse bands completely interrupted in the middle but least interrupted on the third segment; all of them are, therefore, broken up into spots. The bands are basal in position on the segments, and in extent along the lateral margin occupy about two-fifths of the length of the segments. Those on the fifth segment very much smaller. These spots are roughly triangular in shape, with their posteromedial borders somewhat convex. Abdominal pile setaceous. *Legs:* very little of the legs shows in the specimen; the hind femora were short and a little thickened, and their base apparently pale in color. *Wings:* are noteworthy for the heavy vena spuria and the exceedingly sigmoid apical cross vein, joining the third vein barely at right angles, some little way from the tip of the wing. Third vein ending with the costa quite at the tip of the wing.

The following description was taken from the obverse, which is in the British Museum of Natural History:

Head: eyes dichoptic with posterior margins broadly rounded, the facets not enlarged above. Front long, with a dark colored lunule above the antennal base; first and second antennal joints short, subequal, the third about as long as second, but larger and deeper; round in shape. The arista slender, basally thickened, about as long as the antennae. The ocelli do not show. *Thorax:* is confused by the presence of legs, the specimen being preserved by a ventral posterior. Details cannot be satisfactorily ascertained. *Abdomen:* the abdominal sternites appear as dark patches on the third, fourth and fifth segments, with bristle pairs short and sharp, all directed posteriorly. These begin as a narrow strip on the second segment, widened to a truncated wedge on third and becomes a broad trapezoidal area on the fourth segment.

Legs: hind femora rather thick, but uniformly so; thick for a member of the genus *Syrphus*; covered on their basal and lateral surfaces for the whole length with short sharp bristles, which are not setigerous. Hind tibiae slightly curved and also rather thickly covered with similar, short, thick bristles. *Wings:* only the base of the costa of the wing with spinules or short bristles. The remainder are too minute to be readily observed. Costa ending at tip of wing just past the union with the third longitudinal vein. Third longitudinal vein straight.

Locality: Florissant, Colorado. Horizon: Miocene.

Type: reverse in University of Colorado Museum (No. 8566); obverse in British Museum.

Syrphus willistoni Cockerell

Plate 3, fig. A, C; Plate 4, fig. 6, 15

Bull. Amer. Mus. Nat. Hist., **26**: 9. Pl. I. (1909)

Male and female. Length 11.3–6.4 mm.; abdomen and scutellum 6.8–3.8 mm.; wing length 8.2–5.3 mm.; abdominal width 3.2–2.0 mm.; these measurements are taken from a series of fourteen specimens, the numbers of which are noted below.

The agreement of the respective parts is remarkably good. It is not unusual to find a hundred percent size variation or over in Syrphids.

Head: little detail shows, although on occasional patches facets can be seen. I am able to determine that the supraocular facets were enlarged. Antennae short. The third joint appears to be about one and one-half times as long as wide, to be markedly rounded off dorsally and distally so as to come to an obtuse point ventrally. The arista is slightly thickened and held erect. It is but little longer than the third joint. I can make out setae upon the end of the first joint, but not upon the second, though they were undoubtedly present. In the female, the eyes are separated at vertex by about .5 mm. and thence diverge gradually down the front. *Thorax:* dark in color. The pile is not apparent; it was presumably delicate. The scutellum is two and a fifth times as wide as long with even rim and no trace of bristles or pile. *Abdomen:* five segments and the hypopygium of the male are visible. The first is practically covered by the scutellum; the second, third and fourth are nearly equal in length and not greatly differing in width. The second and fourth about the same, the third being slightly wider. The fifth is half the length of the fourth and is narrower. Second, third and fourth segments marked with a large yellow spot on each side, reaching the margin in at least two-thirds of its full length,

and separated in the middle, by a complete median band, which is parallel-sided, and progressively wider from fourth to second segment. The post median corner of each spot is rounded, the anterior median corners practically square. The fifth segment is clear anteriorly, but in the type specimen there is abundant indication that the posterior half was dark. The whole abdomen with the exception of the anterior part of the second segment, where it thins considerably, is covered with abundant, beautifully regular, short, but not unusually short, stiff, sharp tipped hairs. They grow more numerous on the fifth segment. It might be described as stiff pile. Number 3955 is an exception in that the first pair of spots do not reach the margin. Numbers 3961, 3968, 3966 and 3963 show an extra wide abdomen with consequent alteration in shape of the spots. In view of varying pressures, I do not believe these differences are important specifically. *Legs:* unfortunately little is shown. The tarsi appear to be enlarged in No. 3954. The hind femora are slightly thickened. *Wings:* of the typical *Syrphus* type. The third longitudinal vein is ever so barely sinuous. The first longitudinal vein again approaches the costa insensibly, but there is no question of the submarginal cell; it is open. The spurious vein is quite distinct and runs nearly to the union of fourth longitudinal vein and postical cross vein. The second longitudinal vein joins costa at an angle of about fifty-five degrees. The costa and third longitudinal vein end together at tip of wing.

Locality: Florissant, Colorado. Horizon: Miocene.

Holotype: Amer. Mus. Nat. Hist. Allotype: No. 3954 M.C.Z. Additional specimens: Numbers 3955, 3956, 3957, 3958, 3959, 3960, 3961, 3963, 3964, 3965, 3966, 3967, 3968; all Museum of Comparative Zoölogy.

Handsome flies with large clear fenestra, or spots upon the abdomen, which were doubtless yellow in life. These spots are almost rectangular. The species belongs to that large class of fossil *Syrphus* with the bands medially divided.

Syrphus hendersoni James

Canad. Ent., **64**: 265 fig. (1932)

This species is unfortunately based merely upon an abdomen. The pattern of this abdomen is striking, with four segments and perhaps a fifth visible. The outline of the abdomen is broad and the segments are somewhat detached from one another. The length is about half again as long as the width. The spots of the first segment are small,

oval, well-removed from any of the borders of the segment, widely separated in the middle and somewhat pointed towards the anterio-lateral corner. Those of the third segment represent narrow lateral bands continuous basally only for a short distance beginning at the margin, and strongly bulging posteriorly in somewhat abrupt fashion after having run with somewhat uniform width for almost half their total width. The medial portion of these spots might be looked upon as separate, large, rounded medio-basally squared spots which are confluent with the narrow basal and lateral spots. Spots of the fourth segment similar except that the medial rounded portion is smaller, more widely separated and the neck representing the confluence is narrower. The pile of the abdomen is short and delicate, but is a little stiffer in each posterior lateral corner along the posterior border for a short distance.

Locality: Green River, Colorado, Station 25 Kimball Creek. Horizon: Eocene.

Holotype: No. 15652. University of Colorado Museum.

Contrary to the remarks of James, the pattern of this species is not greatly different from that of certain species of western *Syrphus*, such as *amalopis* O. S.

Syrphus platychiralis spec. nov.

Sex indeterminate. Length for the two specimens 7.0 mm. and 8.0 mm.; length of scutellum and abdomen 4.4 mm. and 5.0 mm.; for wing 5.6 mm. and 5.8 mm.; width of abdomen 1.3 mm. and 1.6 mm. *Head:* very little detail shows. The antennae were short, with large third joint and a moderately short arista, remarkably thickened, gradually and evenly, on the basal half. The third appears to have been obtusely pointed ventro-distally. *Thorax:* dark in color. No detail of pile apparent. Scutellum large, one and one-fifth times as wide as long, and somewhat squared in outline. Margin simple. *Abdomen:* slender in form, pale in color with dark posterior cross bands on the segments and each pale band interrupted or subinterrupted medially. The second, third, and fourth segments are nearly equal in length. The fifth is nearly as long as the fourth, but narrower. Hypopygium quite visible and rounded. The median band is widest and complete on the second segment, on the third it is quite narrow and appears to dwindle so it barely reaches the anterior border. The same is true of the fourth segment. The following segment clear. Pile stiff, bristle-like, much as in *Syrphus willistoni* Cockerell, but on the posterior seg-

ments it fails to become condensed and superabundant. *Legs:* hind femora decidedly strengthened without being greatly enlarged; about one and a half times or more as thick as the hind tibiae. Both are everywhere covered with appressed, close-set, short bristle-like pile, running in the appropriate direction. The varying vortices of the pile are easily discernible and it is remarkable that it is continuously of the short stiff type. Hind femora and tibiae dark; the former appear to have been pale basally. *Wings:* typically *Syrphus*-like. I am unable to detect significant differences from those of *Syrphus willistoni* Cockerell, although the marginal cell appears to be more distinctively open.

Locality: Florissant, Colorado. Horizon: Miocene.

Holotype: No. 3926. M.C.Z. (Scudder collection). Paratype: No. 3927. M.C.Z. (Scudder collection).

This species, while close to *Syrphus willistoni*, appears distinct in its more slender abdomen, semi-interrupted bands of the abdomen, and differences in pile.

Syrphus carpenteri spec. nov.

Plate 1, fig. B; Text-figure 1.

Female. Length 5.7 mm. (6.2 mm. including antennae); head 1.5 mm.; abdomen and scutellum 2.8 mm.; wing 4.6 mm.; width of wing 1.8 mm. *Head:* presented from the dorsal aspect, the eyes are widely separated, almost every facet standing out clearly. The ocelli are very clear, forming an obtuse triangle, the posterior pair being one and a half times farther apart than each of them from the anterior one. Upper anterior facets slightly enlarged. The antennae are longer than broad and appear slender, but since they are not large this does not make them appear long. Third joint about equal to first and second in length; perhaps a little shorter. *Thorax:* dark in color—no pile shown. Scutellum short, about two and fifth times as broad as long; evenly rounded with simple margin and no trace of bristles. *Abdomen:* four segments and a trace of fifth visible. First segment dark in color. Remainder of the abdomen with large, quadrate, pale spots, about one fifth of each segment being devoted to dark posterior segmental border, and a progressively narrower median dark stripe, narrower from fourth to second, where it is quite narrow and is about half as wide as the posterior border of that segment. The median band of the fourth segment is three times as wide as the median band of the second segment. The median stripe reaches the anterior border of each seg-

ment and the lateral borders of each segment are dark, though very narrowly so in the middle of the second segment. The basi-median corner of the spots is only slightly convex and the anterior median corners of second and third quite square; on the fourth segment the median stripe widens as it approaches the anterior border of the segment. The abdomen of this species is thus seen to be rather wide, with unusually large subquadrate spots upon it. But the size of the fly is small. Abdomen covered with short thick bristly hair, but not noticeably thicker on the posterior segments. *Legs:* but little shows. Hind femora slightly thickened. *Wings:* well preserved. Curious, short and rather broad. Costa microsetose; spurious vein very distinct, reaching nearly to fusion of fourth longitudinal vein and postical cross vein. Third longitudinal vein nearly straight, what curve it has is not a sinuosity, but a very low gentle arch over its whole length. It joins costa at tip of wing. Costa stops just a little beyond. Marginal cell broadly open and second longitudinal vein joins costa at an angle of about thirty to thirty-five degrees. First longitudinal vein unusually heavy. Subapical cross vein not sinuous, nor sigmoid, but angulate, a trace of spur directed inward.

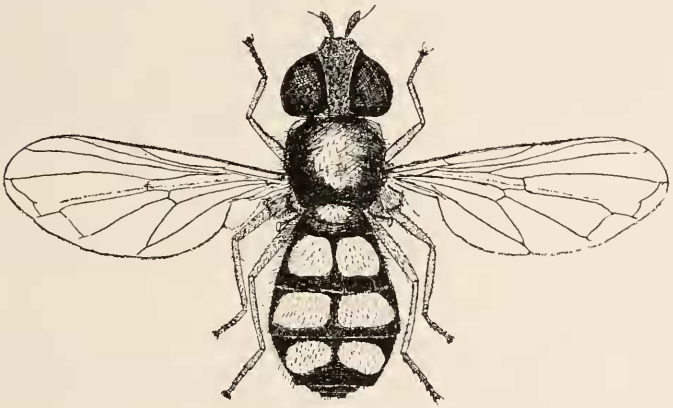

Fig. 1

Locality: Florissant, Colorado. Horizon: Miocene.

Holotype: No. 3928. M.C.Z. (Scudder collection).

I take great pleasure in naming this interesting species for Dr. Carpenter, to whom I owe much for his encouragement in the study of these flies.

Syrphus eocenicus Cockerell

Proc. U. S. Nat. Mus., **64**: 7. Pl. 2., fig. 2. (1924)

"Robust, 12 mm. long; abdomen 7 mm. long and 4.5 mm. wide; head and thorax black, the scutellum not pallid as in modern *Syrphus*, but appearing a shade lighter than the abdominal bands; abdomen with very well-defined markings, the three broad light bands all interrupted by a narrow median band, somewhat broader, but still very narrow, on first segment; the light bands reach the extreme margins, and of approximately equal width, the first however conspicuously wider mesally than the others, the upper edge of the second dark band presenting a double curve on each side; the other dark bands also have a double curve on each side, but not sufficiently to make the light bands appear arcuate; the third light band is much wider at the sides than mesally; there is a fourth light band, broadly interrupted mesally, its inner ends pointed. Wings not preserved."

Locality: Green River, Wyoming (Station above head of the Ute trail above Sellers Ranch, Roan Mountains, Colo., July 1922). Horizon: Eocene.

Holotype: 69179 U.S.N.M. (Not seen).

"A beautiful specimen, although lacking the wings. It appears to be close to *S. umbellatorum* Schiner, but considerably larger, with dark scutellum. It is much larger than *S. lithaphidis* Cockerell, found fossil in the Eocene of Cathedral Bluffs."

The above description is that of Cockerell. On my visit to the National Museum the type could not be located. This is a clearly marked and valid species, which should be easily recognized.

Syrphus lithaphidis Cockerell

Proc. U. S. Nat. Mus., **57**: 253. (1921)

"Length, about 8.2 mm.; head and thorax 4 mm.; length of wing 6.8 mm. Head and thorax fuscous (doubtless black in life); wings hyaline; abdomen pallid with broad dark bands on hand margins of segments, and a broad dark median band, evanescent on the apical half. Venation in general as in modern *Syrphus*, except that the subcostal cell is not nearly so slenderly tapering at the apex, the end of the first vein being somewhat like that figured by Williston for *Paragus tibialis*, though this does not agree well with an actual specimen of *P. tibialis* before me. There is a distinct, though not dark cloud filling the apical part of the subcostal cell, as in modern *Syrphus*. The wing

measurements are as follows: end of auxiliary vein to end of first about 1. 6 submarginal cell on first basal about .8 mm.; last posterior on second basal about .32 mm.; tip of anal to wing margin about .24 mm. The general form and appearance entirely agree with *Syrphus*.

Locality: "Cathedral Bluffs South of Little Tommies Draw at a point where samples were taken. Colorado. (Winchester 17–5)." Horizon: Eocene.

Holotype: 66585 U.S.N.M. (Not seen).

"In the markings of the abdomen, this closely resembles *S. willistoni* Cockerell."

The description of this species is very inadequate and would probably not enable its recognition, although there is no doubt that it is related to *Syrphus willistoni*. The type could not be found.

Syrphus euphemus Heyden

Palaeontographica, **17**: 262. Pl. 45, fig. 29 (1850)

The description given by the author presents the following points of interest and value.

Length 7 mm. *Head:* large, posteriorly truncate, strongly bulging towards the front. The eyes are holoptic and large covering the entire upper surface of the head. *Thorax:* is much longer than broad, and broadest posteriorly; the scutellum is large, its margin rounded and entire. The author states that upon head, thorax and scutellum one can clearly see a light greenish-brassy color. *Abdomen:* has five segments; it was somewhat longer than the thorax and broadest in the middle; the three first segments were about equally long, the fourth shorter, the fifth smaller and posteriorly rounded. The color of the abdomen was chiefly yellow; upon the second, third and fourth segments and perhaps the first there was a rather broad, sharply bordered black fascia; all the segments have likewise a black, somewhat smaller, sharply bordered posterior margin. *Wings:* the first longitudinal vein was branched. The author states that the third longitudinal vein arose from the second beneath the branch of the first with a rather strong deflection near the base of the wing and went without branching to the tip of the wing. He notes the presence of the usual oblique cross vein through which the vena spuria runs parallel to the fourth longitudinal vein. The first posterior marginal cell is closed and moderately stalked.

Locality: Rott, Siebengebirge at Bonn, Germany. Horizon: Oligocene.

Type: One male originally in the Krantz collection. I was not able to locate it.

The species may be known by the narrow, black margins on the posterior borders of the abdominal segments and by the broad, complete, medial fascia which divides the pale markings in half.

Syrphus freyeri Heer

Ins. Oen., **2**: 244. Pl. 17. figs. 12, 12a, 12b. (1849)

The description and illustration given by the author present the following points of interest and value.

Length without head 6.5 mm.; of thorax 2.5 mm.; its breadth 3.6 mm.; of abdomen 4 mm.; its breadth 2 mm.; of wing 7.5 mm. The head is wanting. The thorax is oval and shining black; the scutellum similarly colored. The wings project out over the abdomen and their venation is clear and similar to *Syrphus*. The abdomen is elongate oval and shining coal black; the first segment cannot be discerned; the second is longer than the third, the fourth much shorter, the fifth still shorter. Each segment excepting the first has on each side a light colored spot. They approach one another on the dorsum as far as the black line and thus form an unbroken fascia. On the second segment are two almost triangular spots whose more acute angle lies somewhat medialward; upon the second and third segments the large spots extend to the basal margins of the segments. These spots widen towards the middle of the abdominal segments and leave their posterior margins arcuate. The fourth pair of spots is much smaller, they are oval and lie upon the short fifth segment. The legs are not sufficiently well preserved to furnish data. The wings project out over the abdomen and their venation is clear and similar to *Syrphus*.

Locality: Radoboj, Hungary. Horizon: Miocene.

Type: Two specimens in the k.k. montan. Museum zu Wien. Heer says that one specimen is contained upon a slab with other flies such as *Oedipoda medlanosticta*, *Limnobia vetusta*, etc. I was not able to locate the types.

Heer says that the fly is closest related to *Melanostoma mellinum*, which has a widespread range over the northern hemisphere. It agrees in size, in the glossy, dark colored thorax and spotted maculation of the abdomen with the male of *M. mellinum*. It is unlike that species in the almost triangular spots of the second abdominal segments, in

the spots of the fifth segment. He compares it to *Platycheirus scutatus* Meig., which however has quadrangular, pale abdominal spots. This species may be easily recognized by the large, round spots on each side of the third and fourth segments, and the similar pair of subtriangular spots on the second segment.

Syrphus geminatus Heer

Ins. Oen., **2**: 245. Pl. 17, fig. 13. (1849)

Length of abdomen 5 mm.; breadth 3 mm. *Head:* and part of the thorax are destroyed, only the posterior part of the latter is preserved; it appears to have been black; likewise the scutellum. *Abdomen:* elongate, oval; the first segment very short and dark, the following three more or less the same length; they are entirely light colored and were in life probably white or light yellow. The anterior border of each segment has a clearly contrasted, narrow, linear crossband of black. The posterior border of each segment is light colored, but immediately before that there is a second linear, black crossband; this band lies next to the anterior one of the following segment and borders the yellow posterior border of each segment. Thus there are two black cross lines that closely approach one another and which encloses a light one band formed by the posterior margin of the segment. The fifth segment is distinctly smaller toward the end and on the posterior margin only a dark spot is visible. The very short sixth segment appears to have been light colored. The *wings* are for the most part destroyed; yet on the left wing enough of the veins is preserved so that one can recognize its position in the genus *Syrphus*.

It belongs near the group of *Syrphus balteatus* F. (Europe), *S. nectarinus* Wied. (China) and *S. alternans* Macq. (from Coromandel), differing, however, from all of these by the fact that the middle of the first and second segments are not black, and that always each segment on the posterior border is light; the anterior border, however, is black, while in that one the anterior border is yellow, on the posterior border black. (Rewritten from original.)

This species is easily recognized by the very narrow complete black bands just before the posterior margin of the second, third and fourth segments, as well as similar ones on the anterior margins of the third, fourth and fifth segments, together with the fact that none of these bands are interrupted.

Locality: Radoboj, Hungary. Horizon: Miocene.

Types: two specimens in the K. K. Montan. Museum at Vienna. In my visit to the Museum, which Heer states is the repository for these specimens, I was not able to locate the types.

Syrphus reciprocus Foerster

Abh. Geol. Spezialk. Els., **3**, no. (5): 486. Pl. 14, fig. 28. (1891)

Female. Whole length 6.5 mm. Head: the anterior side of the head with its proboscis is turned backwards, due to pressure. The large eyes do not touch, so this specimen is apparently a female. Only the basal segment of the antennae is preserved. *Abdomen:* this shows principally the ventral side with the sockets of the legs; on the dorsum the large middle segment with the scutellum is seen from the side. It is 4 mm. long and 2 mm. broad and consists of six segments. *Legs:* only a few remnants are preserved. (Rewritten from original.)

Locality: Brunnstaat, Alsace. Horizon: Middle Oligocene.

Type: I have not been able to find the type.

Foerster states that *Syrphus euphemus* Heyden from Rott has the same size, but is more slender. From the figure it seems characterized by a wholly pale abdomen.

Platycheirus haidingeri Heer

Heer, Ins. Oen., **2**: 243 Pl. 17, fig. 11 (1849). Pongracz, Ann. Mus. Nat. Hungarici, **25**: 188 (1928)

Male. Length 13 mm.; length of wings 12 mm.; length of abdomen 8 mm.; width of abdomen 4 mm. *Head:* largely destroyed, but more or less hemispherical. Eye facets plainly distinct, somewhat enlarged above. Head appears to have been a little wider than humeri. Antennae do not show. *Thorax:* dark in color, with evidence of some long hairs on the side. Scutellum small, margin evenly rounded, about one and one-half times as wide as long. *Abdomen:* broad, quite flat, with distinctly emarginate sides and sparse, quite fine setigerous or bristle-like pile, that reaches over the segmental margins, but which is not concentrated along the posterior margins. Pile appressed. Abdomen dark in color. Pattern apparently consisting of narrow lunules, meeting or practically meeting the mid-line but not reaching the lateral margin. Present on second and third segments. Hypopygium present. *Legs:* details of the legs are not plain, except that on what appears to have been the mid-femora, the bristles are sparse, long, slender. *Wings:* well preserved, on both sides the basal one-half with very

sharp outwardly depressed short bristles. Third longitudinal vein turning down slightly opposite the middle of the subapical cross vein. Thus very slightly convex instead of concave. Submarginal cell open, color of veins brown, pubescence of wings thick, and well preserved. Spurious vein conspicuous, very apparently not heavily chitinized. Posterior margin of wing with distinct micro-nodules on margin of wing.

Locality: Oeningen, Germany. Horizon: Miocene.

Type: I have no information as to the place of deposit of the type. I studied a specimen in the British Museum which may have been the type and on which my description is based.

Platycheirus persistens Hull

Plate 4, fig. 4–5

Psyche, **45**: 116. Fig. 3 (1938)

Male. Length 10 mm.; of abdomen and scutellum 6 mm.; of wing 7.2 mm.; second specimen, length 10; thorax and abdomen 6.2 mm.; of wing 3.8 mm. *Head:* hemispherical, obviously narrower than thorax. Eyes narrowly dichoptic. Face dark in color. No details of antennae visible. *Thorax:* dark, though very little pigment is preserved, and no details of pile can be seen. Scutellum semicircular, the margin evenly convex, the width about one and three fourths greater than the length. *Abdomen:* slender, the sides not quite parallel, but slightly convex, leaving the middle segments barely wider. The first segment juts beyond the rim of the scutellum by a fifth the scutellum's length. Second and third segments of nearly equal length, the former longer. Fourth segment slightly shorter than third. Fifth segment two-fifths as long as the preceding one. Hypopygium prominent and smoothly rounded. The segments are marked with brown. The posterior two-fifths of the second segment with a median wedge, pointing to and reaching the anterior border, and similar pattern on the two succeeding segments, the brown of the posterior border on the fourth segment occupying nearly the whole of the posterior half. The fifth segment is clear. *Legs:* slender. For the most part, they are not well preserved, but one pair of tarsi, apparently the left hind tarsi, are well preserved and shows decided expansion and thickening of the joints. *Wings:* poorly preserved.

Female. Specimen No. 3950 (3951) is without head. The wings are a little better preserved and show the third longitudinal vein and

costa ending quite beyond the tip of wing, though not nearly as much as in *Rhingia*. The abdominal pattern is quite similar; beyond the fact that the segments are slightly wider, I am unable to detect differences of importance. One whole hind leg (right) is preserved. The femora were slightly thickened one and two-fifths the width of tibiae and the tarsi were not dilated. The obverse is fragmentary and poor. Perhaps a trace of antennae appears upon it. The opposite hind tarsus is shown, the maculation is deceptive and the abdomen also appears disproportionately short and wide.

Locality: Creede, Colorado. Horizon: Miocene.

Holotype: No. 3949 M.C.Z. Allotype: No. 3950. M.C.Z. (obverse). Paratype: No. 3951. M.C.Z. (reverse). All are poorly preserved.

Platycheirus infumatus Heer

Heer, Ins. Oen. **2**: 246. Pl. 17, fig. 14. (1849). Pongracz, Ann. Mus. Nat. Hungarici, **25**: 190, fig. 53 (1928)

I give below an analysis of this fly drawn from the original description and the illustration.

Length: without head 7.5 mm.; of wings 7.5 mm. *Head:* in the illustration the head was missing. *Thorax:* largely destroyed, the scutellum unrecognizable. *Abdomen:* well preserved but he finds that the abdomen though slender and cylindrical does not have the necessary basal contraction which though slight is characteristic of the recent genus *Doros*. The second and third segments were of equal width; the former segment pale in color with a suggestion of a black middle line at the base. The third segment was quadrangular, black in color with in the middle a narrow, light colored cross band; the margins of this fascia were quite sharp and clear. The fourth segment is of the same size as the third, is light colored in the specimen with small black, posterior band. The fifth segment is much shorter and light and beyond there an indistinct, small, contrasting terminal segment that appears to have been darkly spotted upon the margin. The entire abdomen densely set with very fine pile. *Wings:* well preserved. Heer compares the species to *Syrphus* and *Doros*. He notes the presence of an anterior dark border upon the wing from vena scapularis to the wing tip, in which respect it is very suggestive of *Doros*. Heer found the venation to be typical of *Syrphus*.

This species should be recognizable upon the basis of the parallel-sided abdomen together with the brown wing border and the abdominal pattern. The posterior half of the fourth segment entirely black. It

is possible that this fly was an early type related to *Doros* which, though a small genus, seems to be at home in Europe.

Locality: Radoboj, Croatia. Horizon: Miocene.

Types: Heer states that there are two specimens, one of these upon the same piece of rock as *Formica occulata* and *Myrmica minutula.* I was not able to examine the types, but Pongracz redescribed this insect from a specimen in the Geologischen Bundesanstalt (Vienna).

Leucozona nigra spec. nov.

Plate 2, fig. B

Female. Length 9 mm.; length of wing 6.2 mm. *Head:* large, about as wide as thorax, hemispherical in shape, the antennae short, the third joint of only moderate size, short, a little longer than broad, the arista rather longer than the antennae and basally thickened. No details of either head or thoracic pile can be seen. *Thorax:* short and broad, about as broad as long, black in color. Scutellum semi-circular, at least twice as wide as long; dark. *Abdomen:* robust, flattened, and relatively broad. It is one and one-half times as long as wide and five segments are visible. It appears to have been almost uniformly black, but there is considerable evidence that the posterior half of the second segment bore a wide pale medially interrupted transverse band. There is a bare possibility that there were similarly light colored spots on the remaining segment but here the specimen has more of the appearance which might be expected if portions of the chitin had peeled away. There is an odd shiny luster or vitreus appearance upon the abdomen, thorax, and scutellum of this specimen which I have not noticed on other fossil flies. The pile of the abdomen, while not excessively long as in wooly flies, has the appearance of being longer than usual. *Legs:* no details of the legs are apparent. *Wings:* very little longer than the abdomen, beautifully preserved. Both the apical cross vein is confluent with the third vein some way before the tip at a right angle, and the preceding section of the third vein is slightly curved upward throughout its whole length. Vena spuria quite distinct. Small cross vein strongly oblique before the vena spuria and enters the discal cell a little past that point which corresponds to a third of the way from the base. The outward portion of the fourth vein which bends down to join the lower marginal cross vein is very strongly bent indeed, and this appears to be one of the principal characteristics of the wing. The marginal cell is open and there is a large quadrate spot in the middle of the anterior part of the wing.

Locality: Florissant, Colorado. Horizon: Miocene.

Holotype: one female, coll. Am. Mus. Nat. Hist., No. 157a.

I think that there is no question of this fly being a member of *Leucozona*, though the abdomen is not quite so long as in modern species. The well preserved venation and the characteristic wing spot make this an especially interesting fly.

Asarcina quadrata Scudder

Plate 2, fig. D

Scudder, Bull. U. S. Geol. Surv. Terr., **4**: 752 (1878). Scudder, Tert. Ins., 557. Pl. 9, fig. 13 (*Milesia*) (1890). Williston, Syn. N. A. Syrph., 281 (1886)

Sex indeterminate. *Head:* large, nearly as broad as the thorax, the eyes large, the front quite large, prominent, half as broad as the head and about half as long as broad. The head and thorax while present show few details; they were black in color. *Thorax:* barely longer than wide and widest in the middle. *Abdomen:* well preserved and shows a characteristic pattern. It was oval, of about the same width as the thorax and its ratio of width to length is 9:13. The ratio of abdominal length to thoracic length (including scutellum) is 14:10. The abdomen was thin and flat, with the first segment black or brown and the remaining segments chiefly pale in color margined with narrow fascia and vittae of black or brown as follows: second segment barely over twice as wide as long, with a narrow, posterior, marginal black fascia; the segment is divided in the middle with a narrow black vitta that is barely wider at its apical end and connection with the posterior fascia. Anteriorly it expands just before it reaches the anterior border and sends a slender, bordering fascia part of the way towards each side of the base of the segment. The third segment has posterior black fascia of about the same width as the previous one; it is barely wider in the middle and there is no median vitta whatever; the remainder of the segment is pale. The fourth segment is quite similar in pattern to the third, the posterior fascia attenuated just before it reaches the posterior lateral corners. Fifth segment with only a faint trace of a narrow posterior fascia. The entire abdomen was thickly covered with short setaceus pile. *Wings:* while present show very few details. They were longer than the abdomen in a ratio of 14:20. Scudder states that the third longitudinal vein originates from the second in the middle of the wing, is very gently arcuate in its outer half and appears to terminate just above the tip of the wing. He states further that the fourth longi-

tudinal vein is united by an oblique cross-vein to the third very near the origin of the latter, the marginal vein simple with the fourth longitudinal vein bending down at its tip to meet it. I am not able to verify these details because of past efforts to clear the wing.

There is no question of the subfamily relationships of this species. It could not be a *Milesia* and the abdominal pattern is extremely close to that typical for the large Ethiopian and Asiatic group of flies known as *Asarcina*, which actually range into southern Europe. I think the narrow fascia and broad flat abdomen place it with reasonable certainty in that genus.

Locality: Green River, Wyoming. Horizon: Eocene.

Type (male): no. 14691 in the U. S. N. Museum. Examined by me in the original and from a photograph kindly furnished by Dr. E. A. Chapin.

The Subfamily CHEILOSINAE

There are sixteen genera of this subfamily occurring as fossils. Ten are extinct, and the majority of these are in the Baltic amber fauna only. This is, I believe, explained if one constructs a map to show the distribution of all Recent *Cheilosia*, for certainly in point of density of species in terms of land area scarcely any Syrphid genus exceeds *Cheilosia*. The genus is very abundant today in central Europe. There are only thirty-six Recent genera and subgenera known today in the Cheilosinae. Sixteen is also exactly the number of Recent Cheilosene genera and subgenera known today from Europe, and there are only nineteen from the United States, fifteen of which are the same as European ones. I cannot avoid the conclusion that the Eristalinae and the Volucellinae are now dominant groups, whereas formerly the Cheilosinae were better developed.

It is appropriate to mention here that the Baltic amber Cheilosinae are not quite like modern ones, though in a somewhat indefinite fashion, and that the *Myioleptas* (*valida* excepted) are certainly not strictly like the genotype (a European species).

Of these sixteen Cheilosine genera, possibly *Eoxylota* should go to the Xylotinae, though how we would enlarge the concept of the latter to hold it without danger to the former is not clear. I think we must regard *Eoxylota* and *Hemixylota* (Chilean Recent relative) together with the *Myioleptas* as definitely transitional between these two subfamilies. Since *Myiolepta*-like forms were so common in the Oligocene and since there are three such genera from the shales of the Eocene and

Miocene (*Archalia, Cacogaster, Xylotosyrphus*) and since one definite Oligocene Xylotinae genus is found (*Megaxylota*) it seems reasonable to conclude that we are witnessing in the array of Oligocene Syrphids the origin of the Xylotine subfamily, both in point of facial type and acquisition of megamorphic femora, femoral armament, and migration of the small cross vein of the wing. Early in these studies I was astonished to find many flies strongly favoring Xylotinae, but precluded from there by the basal position of the small cross vein. I was therefore particularly pleased to discover *Megaxylota* in the amber, a true member of the Xylotinae. A study of *Xylotosyrphus* will show that, though the wing has altered, the typical Xylotine pattern of the abdomen has remained practically unchanged for millions of years. These beautiful and exquisite tetramaculate species (*Xylota, Planes*) form some of the most interesting components of our present Syrphid fauna. Finally, there is a possibility that some present-day species of *Cheilosia* can satisfactorily be allocated to *Protorhingia*. Possibly I am wrong in assigning *Doliomyia* and *Palaeopipiza* to the Eumerinae as early foreshadowing types of the modern genus *Eumerus*. If I am, these two genera would return to the Cheilosinae.

Cheilosia ampla Scudder

Bull. U. S. Geol. Geogr. Surv. Terr., **4**: 753 (1878).

Sex indeterminate. Specimen No. 5160: length 5.8 mm.; abdomen and scutellum 3.2 mm.; of wing 5.8 mm. Specimen No. 5162: total length 3.9 mm. (minus head); abdomen and scutellum 2.7 mm.; wing missing. *Head:* no details. What I believe may be an antennae (third joint) appears nearly twice as long as broad, evenly rounded at tip. Arista wanting. *Thorax:* dark in color, covered with fairly long stiff bristly pile, but none of the exceedingly long stiff macrochaetae. Scutellum evenly rounded, its margin simple, with a few bristles; its width two and a third times as great as its length, the curvature perfectly gradual, so that there is no suggestion of squareness. *Abdomen:* five visible segments and what appears to have been male genitalia. The scutellum covers about one-half the length of the first segment. Abdomen short and broad, about one and a half times as long as broad. Second, third, and fourth segments about equal in length, the fourth a little narrower, and the fifth much narrower and short, about one-third as long as the preceding segment. The abdomen is pale. If it was once pigmented it has disappeared from all except a narrow well-marked posterior border on the second, third, and fourth seg-

ments, which border is about one tenth the length of the segment in width. Abdomen covered with very fine delicate fairly long pile. *Legs:* hind femora slightly thickened; hind tibiae about two-thirds as thick as hind femora, and noticeably bowed or arched. Hind basi tarsi long, about two-fifths as long as hind tibiae and at least as long as remaining tarsal joints. All the legs covered with a conspicuous double row of stiff, dark spinules irregularly placed. *Wings:* poorly preserved. Surface villose; costa microsetose. Third longitudinal vein nearly straight with a very slight convexity towards the front, covering its length. Marginal cell widely open. The second longitudinal vein joining costa quite acutely, perhaps at an angle of twenty degrees. The anterior cross vein joins the discal cell quite proximally and both the subapical and discal cells are rather long and slender. (Redescribed from the holotype specimen.)

Locality: Green River, Wyoming. Horizon: Eocene.

Holotype: No. 5160; paratype No. 5162, Mus. Comp. Zoöl.

Scudder placed other specimens (5158, 5159, 5161) as *Cheilosia ampla,* and he placed number 5162, curiously, as *Cheilosia* sp. From a careful examination of this material, I conclude that number 5162 is *Cheilosia ampla* Scudder. Thus there are two specimens. No. 5161 I conclude to be a new species; its generic affinities will be discussed later. Number 5158 and 5159 are certainly indeterminate. They may just as well remain *Cheilosia ampla* ? Scudder. Both are from type locality.

I also place here provisionally a specimen from Dragon, Utah (Green River Shales) which has a markedly setigerous scutellum. Its abdomen corresponds perfectly with that of Scudder's specimen (number 5160). As that specimen shows traces of bristles on the scutellum, perhaps the others were lost. The Dragon specimen may remain here provisionally; I figure its scutellum. (Plate 4, fig. 13).

Cheilosia miocenica Cockerell

Plate 1, fig. C

Bull. Am. Mus. Nat. Hist., **26**: 72, fig. 5a, (1909)

Male. Length 10 mm.; length of wing 9 mm. *Head:* elongate, eyes especially elongate, and the posterior part broad right at the base, leaving (ventrally) the margin concave and fitting tightly over the thorax. Front convex, rounded, bulging, though nowise protuberant. Antennae present but concealed. Front and head dark in color. *Thorax:* dark; pilar details obscure. Some long delicate hairs at side

of mesonotum, just before the wing. Scutellum large, broad, more than twice as wide as long, the rim gently rounded. Squamae and fringe beautifully preserved; squamae not large, the fringe large, hairs of the fringe forked once. *Abdomen:* short, robust, flattened. Hypopygium large. Pile delicate and slender, not at all long. Color of abdomen dark brown, though lighter in the fossil than the thorax, due probably to thinness. Hypopygial and terminal pile not longer than the remaining. Hind femora short and quite slender, its pile short, no visible spines. *Wings:* costal spinules double-rowed, very sharp, rather long, tuberculate. Vena spuria present but quite faint. The radial sector vein arises by offset separation rather than furcation. The wings are considerably longer than the abdomen and the costa like that of *Rhingia* or *Protorhingia* is extensively carried down past the real end of the wing. In fact, it is quite possible that this species should be put in the genus *Protorhingia* (new genus). The marginal angle of the second posterior cell is a little bit rounded but has a spur and there is a very short section only to the fourth longitudinal vein before the origin of the apical cross vein. Both the marginal cross veins are close to the wing border and quite parallel to it, except as they are slightly bowed inward. The small cross vein slightly oblique above the vena spuria, is not quite one-third of the way from the base of the discal cell. The stigma was definitely darker in color. (Redescribed from type).

Locality: Florissant, Colorado. Horizon: Miocene.

Holotype: No. 4444, University of Colorado Museum.

Cheilosia scudderi Cockerell and LeVeque

Plate I, Fig. A

Scudder, Tert. Ins., 561. Pl. 9, fig. 8. (1890) (Cheilosia sp.) Cockerell & LeVeque. American Naturalist, **45**: 357, fig. 4. (1931)

Female. Length 6.3 mm. (6.5 mm. with antennae); length of wing 7 mm. *Head:* small, much less wide than the thorax, elongate in form. Front narrowly separated. Occiput apparently well developed though not tumid. Antennae beautifully preserved, pale in color. The first joint quite short, third moderate in size, with a fringe of 17 or 18 short sharp bristles and a larger one on the outside. Third joint very large, half again as long as wide, evenly rounded at tip. Arista long, two and one-half times as long as antennae, thickened on basal half, nowhere sharply. Color of head dark. *Thorax:* dark, pile short, delicate, a little

longer on post calli. No macrochaetae. Scutellum dark, broad, short, rounded, pile as long as that of calli; no macrochaetae. *Abdomen:* round, barely longer than wide, widest at end of second segment. Pile delicate, not long, only moderately abundant, second segment dark, with a pair of subquadrate basal spots, wider than long, two-thirds as long as segment, completely interrupted in the middle, not reaching margin. A similar pair on base of third segment, less rectangular. Fourth segment apparently all dark. The merest tip of the small narrow fifth segment shows. *Legs:* indistinct. *Wings:* are considerably longer than abdomen, delicate and practically hyaline, the costa ending practically at tip of the wing and having a double row of sharp-spined tubercles. Both the marginal angles of the first and second posterior cell have long spurs from the fourth and fifth longitudinal vein. The apical cross vein joining the third vein very acutely and not far from the tip of the wing. The third vein barely curves over its whole length outwardly. The vena spuria present, small cross vein quite oblique above the vena spuria, and entering the discal cell just past the first fourth-way point. Stigma very faint. (Redescribed from type).

Locality: Green River, Colorado; Dragon, Utah. Horizon: Eocene.

Holotype: No. 15463a in the University of Colorado Museum, from Green River, Colorado. Also No. 3952 in the Museum of Comparative Zoölogy, from Dragon, Utah, belongs to this species.

This species is unique in having light spots on the second and third segments of the abdomen. The abdomen considered alone is almost identical in its roundness, flatness, type of pile and pattern with that of *Phalacromyia* of the American tropics today. There are no marked species of *Cheilosia* living, with one exception (Europe) and this is of a different sort.

Cheilosia hecate spec. nov.

Plate 3, fig. D; Plate 4, fig. 14

Female: length 8.5 mm. including head; abdomen and scutellum 4.4 mm.; width of abdomen 2.7 mm.; length of wing 6.5 mm.; width of thorax 2.8 mm. *Head:* very little detail can be made out of the head owing to its position. One antennae with its arista is clearly shown. Color of antennae light reddish brown throughout. The third joint oval, tapering to an obtuse point. The arista situated at extreme base of the joint and consisting of an unusually long bristle, evenly and gradually and conspicuously strengthened on its basal half, and held

at an angle of forty-five degrees from the joint. The third joint is about two times as long as the second and the first appears to be ever so slightly longer than the second. First and second joints minutely setose. There is no trace of particularly long setae upon their distal rims, nor is there trace of pubescence on the arista. *Thorax:* the dorsum is dark in color, and covered with fairly long, soft, bristly hairs but not in any sense spinose. However, there are present the extremely long setigerous bristles on both calli and scutellar margin which are the characteristic of many *Cheilosini, Volucellini,* and of *Ferdinandea.* There appear to be four on each side of the scutellum, the median pair crossed, and some weaker ones at base and to one side of the scutellum. The scutellar marginal bristles are at least as long as the scutellum. There are three equally long bristles on the post calli and shorter ones just before the wing. The humeri appears to be pilose. The scutellum is wide with evenly convex rim. *Abdomen:* five segments are visible. The greater part of the first is covered by the scutellum. The second is two and one-half times as wide as long; the third is equally long and practically as wide, whereas the fourth is again two and one-half times as long as wide but is considerably shortened in length. It is about three-fifths as long as the second. The fifth segment is inconspicuous. The most noticeable feature of the abdomen which is unicolorous and dark, is the middle posterior cone of extremely strong, long setigerous bristles. These overlap the following segment. *Legs:* the hind femora very slightly thickened. The hind tibiae slender, together with the hind femora covered with thick moderately long bristly pile. *Wings:* these are of the typical Cheilosinae type. The costa is microsetose. The third longitudinal vein is then strongly deflected on its extreme distal part without even suggesting a kink or bend. As a matter of fact, the first longitudinal vein approaches the costa so insensibly that it could be said the marginal cell was just closed. It would be better to describe it as just open. The second longitudinal vein joins the costa at an angle of twenty-nine to thirty degrees. The anterior cross vein is situated well before the middle of the discal cell, and the spurious vein is quite distinct to within a short distance of the union of lower marginal cross vein and fourth longitudinal vein. The veins are pale brown, the wings quite hyaline, with stigma. Under the high power the small close set villi of the wing are beautifully apparent. These wings were a fourth longer than the body.

Male. Length of this specimen 9 mm.; of wing 6.7 mm.; of abdomen and scutellum 5.3 mm.

Specimen No. 3953 is a profile of this species. The long bristles of

the fourth segment shows nicely and venation is quite indistinguishable from No. 3939. It shows the same subdistal approximation of both of the veins, second and third longitudinal, to each other one. The details of the facial profile are of greatest interest. The antennae are hanging downward and only its narrowest edge or surface shows. It does not furnish much of interest. Beneath the antennae the face is first gently concave, then slowly and slightly produced into what might be termed a gentle tubercle, since it retreats more suddenly below. There is present what appears to be facial strips. Several things are very clearly and indisputably shown: the nature of the profile, the quite convex front, and the degree of production and development of the face and cheeks below the eyes. On the margin of the eyes above the front is a trace of what may have been pile. The specimen is obviously a male. One hind tarsus shows apicotarsal joint, three long bristles, bicolored claw and one pulvillus. The hind femora had long, though delicate, bristles beneath. The pile of the thorax was erect, fairly stiff, short, and abundant.

Locality: Florissant, Colorado. Horizon: Miocene.

Holotype: No. 3929. M.C.Z. Paratype: No. 3953. M.C.Z. (Scudder collection).

Cheilosia pratjei spec. nov.

Plate 11, fig. 93, 94; Plate 12, fig. 104; Plate 13, fig. 111

Male: Length 10 mm.; length of wing 9 mm. *Head:* very large, slightly wider than thorax. Eyes enormous and conspicuous, broadly touching in the male. Upper facets enlarged vertical triangle very small, not quite restricted to the ocelli. Front not large, convex, with a median crease on the upper half. Front thickly long pilose, margin before the antennae lunulate. Antennae located above the middle of the head in profile. Third joint large and flat, scarcely longer than wide, broadly rounded apically. Arista very long, strongly but not sharply thickened basally; about three times as long as the antennae. Face below the antennae with a broad obtuse tubercle apparently near the middle. Due to the angle of the specimen it is impossible to determine whether or not the face is distorted. Face with a single very large obtuse tubercle below the antennae. Face not greatly produced downward. Cheeks easily visible below the eyes, but not prominent, some strong stiff bristly hairs on the lower part of face and cheeks. Upper part of face and region of tubercle appears to have been pubescent only. *Thorax:* very broad; as wide as long, somewhat convex, thickly

and densely pilose. Pile rather long everywhere, pale whitish in color, the pale white pile on the sides before the wing longer and somewhat bristly. Scutellum very large, barely twice as wide as long; the disc and the rim convex, the former covered with thick upright pile, becoming long near the rim and on the margin and rim with forty or fifty long stiff bristly hairs about half of which are set within tubercles, all of these are pale in color. Dorsum of thorax dark, scutellum dark but subtranslucent. *Abdomen:* but little longer than wide, broad and robust, about as wide as thorax, somewhat convex, the apex very broad, the color dark, especially on the posterior halves of the segments. Each segment light brownish or yellowish brown basally. Surface of abdomen thickly long bristly pilose. Hypopygium large and thick, but quite concealed. *Legs:* hind femora elongate, stout but not thickened, with exceedingly numerous, rather long bristly spines which are not sharp pointed but not thick along the ventral surface. Legs dark in color, the bases of the tibiae and the tarsi somewhat brownish yellow. *Wings:* much longer than abdomen quite pointed apically, broadest apically, uniformly dark brownish. Stigma a little darker. Vena spuria very heavy and chitinized. Small cross vein enters the very long discal cell about three-eighths of the way from the base. Marginal cross vein extremely long, practically straight, close to wing margin and parallelling it. The apical cross vein about five-eighths as long as discal cell. The first posterior cell apically drawn out into a very sharp acute point owing to the fact that the apical cross vein joins the third vein practically at the tip of wing. Third vein and costa end at tip of wing.

Locality: Baltic amber, Germany. Horizon: Lower Oligocene.

Holotype: in the University Museum of Konigsberg. The specimen bears no label, but the slide is labeled K; I affix the No. H 103.

I take pleasure in naming this species for Dr. Pratje, who gave much courteous and helpful assistance in my study of amber Syrphids.

Cheilosia oligocenica Théobald

Les Insectes fossiles des Terraines oligocenes de France, p. 353, pl. 3, fig. 1.

Length 8.75 mm. *Head:* transverse, almost as large as the thorax; the two large eyes are placed upon either side; the front is slightly prominent. The vertex is elevated and at the front there is a fragment of the basal part of the antennae with the arista lacking. *Thorax:* oval, the scutellum easily distinguished. *Abdomen:* ovoid, with five segments visible. *Legs:* not mentioned. *Wings:* these are well pre-

served and it can be clearly seen that it belongs to the Syrphidae; the longitudinal veins are a little undulated. The general color of the fly is black.

Apparently the preservation of this fly is sufficient to provide good specific characters. A more critical analysis of the wing should throw more light upon the generic and subgeneric relationships of this fly.

Locality: Aix en Provence. Horizon: Oligocene.

Holotype: Am 24, Mus. Nat. Hist. Natur., Paris.

Cheilosia germanica spec. nov.

Plate 11, fig. 83, 95; Plate 12, fig. 99; Plate 13, fig. 112

Male. Length 8 mm.; length of wings 7.5 mm. *Head:* large, definitely wider than thorax. Eyes apparently bare, touching in the male for some distance. Vertical triangle not very small, rather long and acute, due to the fact that the eyes are not as widely touching as in some species, with but nine or ten long curved bristles at the top. Front steep; short; I cannot discern whether it was pubescent but it appears to have been bare. Antennae situated a little above the middle of the head in profile. Third joint large, rather deeper than long, broadly rounded, all the joints and the arista black, the latter a little over twice as long as the antennae, strongly thickened basally with two basal joints discernible. Face and cheeks black, the former with a conspicuous tubercle in the middle. Face beneath the antennae conspicuous. The cheeks very little developed and the face at the angle between cheeks and face produced not more than length of antennae. Occiput very narrowly visible in profile, with a fringe of short bristly hairs. *Thorax:* convex; its pile bristly, moderately long and thick, a few short macrochaetae on the posterior calli and side of the thorax above the wing. Scutellum large, convex on disc and rim, about twice as wide as long, with three or four pairs of long slender bristles on the rim and a few shorter ones on the sides above. *Abdomen:* nearly twice as long as wide, barely wider than the thorax, dark reddish brown in color, widest in the middle of the second segment, gradually tapering past that to the broad and rounded apex of the abdomen. *Legs:* hind femora very stout but little thickened, with only stiff bristles ventrally. Hind tibiae practically as long as femora, rather thickened on the outer two-thirds, the hind basi tarsi as long as the remaining joints and considerably thickened, very dark, femora and most of the tibiae blackish; tarsi apparently very dark brown. *Wings:* uniformly dark brown, obscured by being closely folded and overlapping the abdomen.

Stigma very dark brown. Vena spuria distinct but weak. The small cross vein enters the discal cell a little less than one-third of the way from base. Lower marginal cross vein very obliquely directed away from wing margin. Apical cross vein at first obliquely directed away for a short distance then bent outwards, joining the third vein not far from tip of wing. Third vein and costa end at tip of wing. Wing pointed, apex broad basally, upper squamae with six or seven very stiff bristles, acute apically, the basal marginal angles of the first and second posterior cells spurred.

Locality: Baltic amber, Germany. Horizon: Lower Oligocene.

Holotype: at the University Museum at Konigsberg. It bears the number B 16560.

Cheilosia nigrachaeta spec. nov.

Plate 11, fig. 80; Plate 12, fig. 102, 107

Male. Length about 6 mm.; length of wing 5.5 mm. *Head:* large, much broader than thorax. Eyes large and conspicuous, broadly touching in the male, the front not large, steep, very little produced. Impossible to determine whether pilose, pubescent or bare. The antennae above the middle of the head in profile short, third joint large, not as long as wide, broadly rounded apically, the arista half again as long as antennae, strongly thickened on the basal two-thirds. The first and second antennal joints dark brown, third joint lighter in color, especially basally, rather thick on the bottom. Face concave below the antennae, with a very distinct tubercle. Owing to poor preservation, it is difficult to determine the nature of the covering. It appears to have been densely pubescent. Face not produced away from eyes for more than the length of the antennae. Crease of the side margins deep. Occiput scarcely visible in profile. From above, the posterior profile is considerably concave about the vertex and behind the ocelli. *Thorax:* quite convex, the dorsum and scutellum very large, a little over twice as wide as long, the apex a little flattened. The margin with a few long slender bristles; the calli and sides of the thorax with strong short macrochaetae. *Abdomen:* a little longer than broad, quite robust, barely wider than thorax, much of it obscured by the wings and preservation. *Legs:* more slender, barely thickened a little in the middle with stiff bristles only ventrally. Legs dark brown, tarsi somewhat yellowish brown. *Wings:* uniformly pale brown, marginal angles of the first and second posterior cells with spurs. Lower marginal cross vein short, more or less straight, strongly directed away

from wing margin, the last section of the fourth vein before the origin of the apical cross vein rather long and two-fifths as long as apical cross vein. Apical cross vein sinuous at origin, joining third vein near the tip of the wing. Third vein and costa end at tip of wing. Stigma not darker than remainder of wing. Vena spuria faint. Anterior cross vein oblique, joining the discal cell a little less than a third of the way from base.

Locality: Baltic amber, Germany. Horizon: Lower Oligocene.

Holotype: in the University Museum at Konigsberg. The specimen bears the number B 14281.

Cheilosia bruesi spec. nov.

Plate 11, fig. 90; Plate 12, fig. 98; Plate 13, fig. 118

Male. Length 7.5 mm.; length of the wings 6.5 mm. *Head:* large, wider than thorax, the eyes apparently bare, anterior facets enlarged, touching in the male but not for a great distance. Vertical triangle large, not restricted to the ocelli, the front small, protuberant at the level of the antennae, subconvex, somewhat steep, apparently without pile. The presence of pubescence cannot be ascertained. Antennae situated about the middle of the head in profile, but a little below the middle of the eyes. Antennae short, third joint very large, suborbicular, scarcely longer than wide, all of the joints and the arista dark reddish brown, the latter but little longer than the antennae, strongly thickened on the basal half. Micropubescent. Face beneath the antennae quite concave, rising to the low, obtuse, but otherwise well formed tubercle, which is situated a little above the level of the bottom of the eyes, then descending gently below the tubercle to the margin of the epistoma, a distance half as long as the tubercle itself. Face somewhat produced at the angle between the cheeks and face at least as long as the antennae. Facial strips wide and conspicuous. Occiput visible only on the lower third behind, with some strong bristles above and at the vertex and some long fine hairs at the bottom near the cheeks. *Thorax:* dark in color, very convex, the pile sparse, short. Scutellum quite large, semicircular, convex on disc and rim. Marginal bristles short, the apical two bristles the longest, not very heavy and scarcely half as long as the length of the scutellum. *Abdomen:* twice as long as wide, wider than thorax and widest at end of second segment from which it tapers gradually to the broad obtuse apex of the hypopygium. Four segments, a small portion of another on the left hand posterior corner and the exceedingly large globose hypopygium are visible. The

first two segments occupy scarcely more than a third of the length of abdomen. Abdomen sparse, short bristly, with a little longer bristly pile at the sides of the second segment at the base. *Legs:* hind femora short, somewhat thickened, the thickening spread over the whole length, the ventral surface of the femora for the greater part of the length, especially outwardly, with short spinous bristles. Hind tibiae seven-eighths as long as femora, considerably thickened on the apical half, blackish in the middle and very dark brown basally and apically. Femora very dark brown. *Wings:* considerably longer than the abdomen, the third longitudinal vein scarcely bent downward, ending with costa practically at tip of wing. Vena spuria faint, the last section of the fourth vein about two-fifths as long as the apical cross vein, barely sinuous. Basal marginal angle of first and second posterior cells short spurred, the apical cross vein very long, barely sinuous, joining the third vein rather close to apex.

Locality: Baltic amber, Germany. Horizon: Lower Oligocene.

Holotype: in the University Museum at Konigsberg. The amber block was marked "Family Leptidae" by someone. I affix the number 5 B 348 on the block.

Cheilosia sepultula Cockerell

Proc. U. S. Nat. Mus. 51: 96 (1917)

This species was described in a comparative way by Cockerell with reference to *C. miocenica* Cockerell. This method is not entirely satisfactory in such a large and difficult genus and an examination of a type will be necessary to determine its specific nature. I quote below the measurements taken by the author of the species.

Length about 8.5 mm.; width of thorax about 3.5 mm.; length of wings 8 mm. The head and thorax are dark. The abdomen is pale, thinly pilose with black or very dark, narrow, sutural bands but no longitudinal vittae. The costa is thick with two rows of minute bristles as in *C. miocenica.* The apical angle of the first posterior cell is more acute than in *miocenica.* In the following measurements those for *miocenica* are given in parenthesis.

Width (depth of marginal cell) .3 mm. from end .... .35 (.27) mm.

Length of first posterior cell from lower basal corner to upper apical corner ..... 4 (4) mm.

Submarginal cell on first basal (not allowing for curve)..... 1.2 (1.28) mm.

First basal on second posterior..... .83 (1.09) mm.
Second basal on second posterior..... .27 (.32) mm.
Second basal on third posterior..... .3 (.25) mm.

Locality: Florissant, Colorado. Horizon: Miocene.

Holotype: no. 61994 U. S. N. M. I was not able to locate the type.

"The smaller specimen, assigned to *C. miocenica*[1] and collected by Mr. Rohwer, belongs to this species."

This species is unrecognizable on the basis of its present description. There are so many species of *Cheilosia* differing in minute ways that a comparison from a photograph is needed.

Genus Cheilosialepta genus nov.

Head: very large, widely holoptic in the male. Eyes bare, anterior facets enlarged, vertical triangle small with protuberant ocelligerous tubercle and with a few long curved bristles. Front not large, steep, flat, densely pubescent only, nowhere markedly swollen or convex. Antennae short, third joint very large, little longer than broad, thin above, rather thick below. Arista elongate, strongly thickened basally and pubescent. Face quite narrow, almost carinate, due to the pinched and thinned central ridge, which is broadly rounded. There is only the faint indication of a tubercle in the male, and the female with similar narrow and protuberant face is without tubercle, and very narrowly concave. *Thorax:* convex, the margin of the mesonotum, posterior calli, upper part of mesopleurae and the rim of the scutellum as well as posterior margin of the mesonotum before the scutellum everywhere equipped with enormous heavy machrochaetae suggesting *Ferdinandea* (Recent genus), but of course the face is very different from *Ferdinandea*. Scutellum very large, perfectly semicircular, with convex rim and disc. *Abdomen:* large and elongate. Hind femora slender without spines below. The hind tibiae with strong bristles laterally near the middle. *Wings:* very much like those of *Myiolepta*.

Genotype: *Cheilosialepta baltica* spec. nov.

This genus is distinguished from *Myiolepta* by the narrow, almost carinate face, the more broadly holoptic eyes of the male, the heavy macrochaetae of thorax and scutellum and the semicircular shape of scutellum and the absence of spines on the hind femora and the presence of spinous macrochaetae in the middle of the hind tibiae. It

[1] Bull. Amer. Mus. Nat. Hist. **26**:72. (1909).

differs from *Cheilosia* by the non-tuberculate face of either sex and the *Myiolepta*-like venation.

Cheilosialepta baltica spec. nov.

Plate 8, fig. 54; Plate 9, fig. 67, 68, 69; Plate 10, fig. 79

Male. Length 7.5 mm.; length of wing 6 mm. *Head:* very large, distinctly wider than thorax. Eyes enormous; anterior facets but little enlarged; eyes touching broadly in the male. Vertical triangle small, restricted to the ocelli. Bristles erect, long, and stiff; they consist of a cluster of fourteen, two of which are placed at the extreme posterior end of the triangle. Front not large, bare, densely pubescent, with a lunulate margin above the antennae. Antennae short; the third joint quite large, half again as long as wide. Arista long, strongly thickened basally, about twice as long as antennae; all of the joints reddish brown, not very dark. Arista blackish. Face reddish brown, quite concave, below the antennae rising to a large conspicuous tubercle and then abruptly descending the short distance to the epistoma. Face not deeply produced, cheeks very short in profile. Occiput scarcely visible at any point due to the prominence and curvature of the eyes and with a fringe of delicate hairs. *Thorax:* convex, barely longer than wide; the dorsum with thick, short bristles. Humeri pilose; mesopleura with one excessively long heavy bristle. Side of thorax behind the humeri with three long bristles. Margin of the dorsum just above the base of the wing with three heavy bristles and the posterior calli with three heavy still longer bristles. The dorsum of the thorax just before the scutellum with four heavy long bristles and the margin of the scutellum with four pairs of very long, very heavy bristles longer than the length of the scutellum. Disc of scutellum somewhat flattened, thick, short, bristly, in shape twice as wide as long, extreme apical margin a little subtruncate, the rim broadly rounded. *Abdomen:* a little more than half again as long as wide, tapering considerably from the end of the second segment; the last two segments scarcely longer than the first two; only four segments visible. Sides of the abdomen slightly curled over, quite thin. Abdomen quite convex, the posterior segment sub-cylindrical. Hypopygium large and rounded, quite concealed. Abdomen short, appressed bristly, some very long stiff bristles at the base and sides of the second segment, and a strong radially directed tuft of shorter bristles at the junction of the first and second segment on sides. *Legs:* hind femora a little thickened on the basal two-thirds. Ventrally equipped only with stiff relatively short bristles. These

bristles might be described as subspinous but they are not true spines. *Wings:* considerably longer than abdomen, the very long, almost strong apical cross vein joins the third vein almost at the tip of wing. Third vein a little drawn down on the outer third, ending with the costa, but not prominently. The marginal cross veins practically parallel the wing margin and both of the basal marginal angles of the first and second posterior cells are spurred. Vena spuria distinctly and heavily chitinized. *Wings:* pale yellowish. Stigma deep brownish-yellow.

Female. This female is more poorly preserved in many respects than one that I describe as the male. The hind tibiae bear in the middle on the outside a row of six or seven long stout bristles, the coxae bear a fan-like row on the outside of four stiff bristles and others at the point where they touch; the metasternum bears a very few long hairs but is mostly bare. The color of the legs is dark brown; bases of the tibiae and anterior tarsi somewhat lighter. The apex of the middle femora on the outer lateral side bears a little cluster of three stiff long bristles.

Locality: Baltic amber, Germany. Horizon: Lower Oligocene.

Holotype: in the University Museum at Konigsberg. This specimen bears the number 11B665 on the block itself; the slide on which it is mounted bears the number 2665 and also bears the following designation: VII. 2. 288 (Museum Stantien and Becker).

Paratype: in the University Museum at Konigsberg. The specimen bears the label B 16787, the slide the number 16787.

Genus Arctolepta gen. nov.

Head: large, much broader than thorax, in profile from above very concave. Front quite flat, somewhat prominent. Antennae barely above the middle of the head in profile, short, third joint large, not longer than broad, very orbicular. Arista elongate, face deeply concave. Epistoma thrust forward. Occiput visible in profile throughout. *Thorax:* very little longer than broad, quite convex; scutellum large, convex on disc and rim with many long bristles on the margin of the scutellum but none on the mesonotum before it. Mesonotum on sides and posterior calli with some long bristles. *Abdomen:* elongate, over twice as long as wide, rather flattened basally, somewhat convex on the terminal segment. Pile short, appressed, bristly. *Legs:* hind femora stout, but not greatly thickened, slightly arcuate with many stiff bristly spines below and apically. Hind tibiae practically as long as femora. *Wings:* elongate, not as long as abdomen. Apical cross vein joining third vein some distance before the tip of wing. Vena spuria

present and weak. Apical cross vein slightly sinuous; last section of the fourth vein relatively short.

Genotype: *Arctolepta calamitans* spec. nov.

This fly cannot go in *Cheilosia* for lack of tuberculate face or *Myiolepta* since the scutellum is chaetate and the apical cross vein is confluent remote from tip of wing. It differs from *Sericolepta* in the spiny scutellum, orbicular antennae, and the simple femora and long tibiae, small size, much shorter apical cross vein, and the wings not being as long as the abdomen. In *Sericolepta* in spite of the large abdomen, the wings are much longer. From *Cheilosialepta* it is at once very distinct in the remote point of confluence of the apical cross vein.

Arctolepta calamitans spec. nov.

Plate 6, fig. 36; Plate 10, fig. 74–76

Female. Length 10 mm.; length of wing 6.4 mm. *Head:* very large Eyes bare, front and vertex and cheeks black in color, the front with some scattered light erect pile. Face pubescent only. Antennae light brownish orange, the basal bristles black. Arista black. Occipital bristles above stiff and black, the pile in the middle and below is pale. *Thorax:* dorsum of thorax and scutellum black in color, aeneus. The pile on the sides pale and erect. The many short bristles that broadly cover the mesonotum, together with the macrochaetae on the sides and scutellum, are black. *Abdomen:* black throughout, the short stiff spinous bristles appressed and black and very sharp and very little longer even at the extreme tip of the abdomen. Bristles of genitalia pale. *Legs:* throughout black in color except that the anterior tarsi are brownish red. Hind basi tarsi as long as the remaining segments, somewhat thickened, the bristles below brush-like and thick. The pile at the base and along the dorsal length of the hind femora, the bristles and spines below and on the tibiae and the strong spines and the apex of the hind tibiae as well as the middle tibiae black. *Wings:* uniformly brownish. Last section of fourth vein about half the length of the marginal cross vein, the small cross vein is extremely oblique above the vena spuria and enters the discal cell almost at the midway point but is basal. Both the marginal angles of the marginal cells with very short spurs.

Locality: Baltic amber, Germany. Horizon: Lower Oligocene.

Holotype: in the University Museum at Konigsberg, from Baltic amber, number X444.

Genus PROTORHINGIA genus nov.

Head: large, the eyes particularly conspicuous and bare. Upper facets somewhat enlarged, broadly touching in the male, the vertical triangle in the male quite small, restricted to the ocelli which are strongly raised above the surface. Front small, rather steep, scarcely protruding. The antennae located distinctly below the middle of the head in profile. Antennae short, but the third joint quite enlarged and about twice as long as wide and suborbicular. Arista very long and slender, not noticeably thickened at base, bare. Face below the antennae gently concave and retreating, the epistoma barely produced forward. Face without tubercle. Face below the eyes but little produced and in length about equal to length of the antennae. Occiput narrowly visible on the lower part of the head, not in the slightest discernible on the upper two-thirds of head. *Thorax:* broad, about as wide as head across the wings, dorsum quite convex. Scutellum very large, hemispherical, convex on the disc and rim. Thorax and abdomen short pilose, the former with a few macrochaete. Scutellum with many long stiff bristles about apex. *Abdomen:* quite short, broad, compact, the terminal segments narrow, curling down and thin at the sides. *Legs:* hind femora short, very little thickened with only a few stiff bristles disto-ventrally. *Wings:* elongate, much longer than abdomen, with typical *Syrphus* venation, except that the costa and with it the third vein are grossly and conspicuously pulled down beyond and below the tip of the wing for some distance and are as conspicuously bent downward as most *Volucellas* are bent upward. This leaves the sub-marginal cell grossly widened and flared at apex. The marginal cross veins are long, due to the length of the wing, close to wing border, almost parallel to it, and the basal posterior angles of both their respective cells are spurred. Wings villose throughout.

Genotype: *Protorhingia carpenteri* spec. nov.

The genus *Protorhingia,* it seems to me, is a well founded one, for the wing in its way is extremely unique. A very few of the two hundred or more living species of *Cheilosia* show a somewhat similar wing in regard to the great extension of the costa around the end of the wing. Since this is a characteristic of *Rhingia,* which is, of course, abundantly distinct on the basis of its conoidal snout, it seems at once apparent that the form that I now describe is a true connecting link between *Rhingia* and *Cheilosia* and it is possible that these few living members of *Cheilosia* should be put in *Protorhingia.* There is this difference, however, between *Protorhingia:* modern *Cheilosia* must have the face

tuberculate in the male. In fact, a large number of *Cheilosia*-like forms from the amber, species which in every way suggest our *Cheilosia* probably cannot be placed in the genus *Cheilosia* in the modern sense purely because one of their sexes is non-tuberculate. It will be remembered among the living genera of the subfamily Cheilosinae that there are a considerable group of genera sharply separated from *Cheilosia* and its congeners on this very character of only males tuberculate. It seems evident with so many concaved-faced species and genera from the amber that we are witnessing, when combined with living forms, the three types of facial combination:

a. Faces of both sexes distinctly non-tuberculate.
b. Faces of one sex tuberculate (always male?).
c. Faces of both sexes distinctly tuberculate.

PROTORHINGIA CARPENTERI spec. nov.

Plate 10, fig. 77

Female. Length 10 mm.; length of wing 9 mm. *Head:* front and vertex not very widely separated, perhaps separated by three-tenths of a millimeter. Antennae with the third joint apparently quite large and but little longer than broad, its shape is somewhat obscured owing to whitish excretion. Face not greatly produced but the cheeks are certainly deeper than in *Protorhingia magnipennis;* at the lower part of the face there is a certain amount of vesicular swelling that incloses a few bubbles. *Thorax:* dorsum of thorax with one bristle behind the humerus and two quite long ones on the posterior calli. The pile of the dorsum of the thorax is quite short with an occasional longer bristle. Scutellar disc also very short, bristly pilose with only a few long bristles on the margin. One or two of these are broken off but there appears to have not been more than six or eight bristles two-thirds of the length of the scutellum. Scutellum convex with convex rim. Color of thorax dark, shining brown with three vittae black in color fused on the anterior two-thirds and V-shaped posteriorly. It is possible that in life these were not discernible or at least obscure. *Abdomen:* a little over half again as long as wide, tapering gradually from the end of the second segment. Base a little bit wider than the thorax and narrowly luteous or subtranslucent in color. The remainder of the abdomen, including the last half of the second segment, quite dark. Abdominal pile short, thick, and bristly. *Legs:* hind femora short, very little thickened, with only a few stiff bristles disto-ventrally. *Wings:* hyaline in color, the basal and anterior marginal area, including the stigma, ob-

secured by bad preservation. The last section of the third vein past the confluence of the apical cross vein is very short and is about one-fourth the length of the subapical cross vein.

Locality: Baltic amber, Germany. Horizon: Lower Oligocene.

Holotype: no. 3969, Mus. Comp. Zoölogy; consists of a crude specimen preserved in an uncut piece of Baltic amber, purchased by the author from the Bernstein company in Konigsberg.

Protorhingia magnipennis spec. nov.

Plate 10, fig. 78

Male. Length about 12 mm., the length of the wing 12 mm. *Head:* quite large, the posterior occipital fringe very short and consisting of but a few rows of hairs except in the region of the very short slightly convex cheeks where it is a little longer. Facial strips narrower than *carpenteri*, the antennae dark reddish, lighter above and near the base; the apex and lower portion blackish. The arista dark in color, pile of vertex longer than elsewhere on the head, erect and somewhat stiff. Front very slightly convex, with scarcely any trace of median impression and densely pubescent; apparently pale in color. The cheeks, narrow sides of face and apparently the greater part of the face except for a somewhat triangular area on the sides pale pubescent or pollinose. *Thorax:* densely erect, bristly hairy. The pile becoming somewhat appressed on the posterior part of the dorsum. Surface pile of scutellum dense, longer than that of dorsum of thorax, the marginal bristles quite stiff, nearly two-thirds as long as scutellum and composed of about fifteen or more on the semi-circle. The color of the thorax and scutellum appears to have been brilliant coppery or violet. Humeri pilose, two small bristles directly in front of the wing, three others on a level with or behind the humeri, three on the posterior calli. Apex of the dorsum before the scutellum without marked bristles. Abdomen subshining metallic. Pile erect, thick, and bristly and not very long, appressed only at the extreme margins of the terminal segment. *Legs:* hind femora obscured by poor preservation, the anterior femora small, slightly arcuate, considerably thickened, and with a row of long stout bristles on the posterior side. *Wings:* more or less hyaline, especially apically, the basal point a little yellowish or brownish, the stigmal cell deep yellowish brown. Vena spuria weak and faint but with a conspicuous node just past the origin of the second and third longitudinal veins. Alulae quite large and appear to be rather dark; their fringe is long. The veins of wings are strong and the section of third vein from the

confluence of the apical cross vein to the tip is not quite one-third of the length of the apical cross vein.

Locality: Baltic amber, Germany. Horizon: Lower Oligocene.

Holotype: in the University Museum at Konigsberg, No. K7559 (collection Klebs).

Rhingia species Hope

Trans. Ent. Soc. London, 4: 252 (1845–47)

Sex indeterminate. Length 11 mm. This specimen is very unsatisfactory in many ways. While it appears to be a *Rhingia,* the venation cannot be worked out with sufficient certainty to determine its nature. I therefore refrain from assigning a specific name.

Locality: Aix in Provence, France. Horizon: Oligocene.

Holotype: Hope Museum, Oxford, England. The type was studied.

Rhingia zephyrea spec. nov.

Male (apparently). Length 7.8 mm.; of abdomen and scutellum 4.6 mm.; of wing 6.6 mm. *Head:* preserved from dorsal view. The epistoma projects conoidally in front of the face. The antennae are scarcely discernible. No details can be seen. Face dark in color. *Thorax:* dark in color. Pile not discernible. Scutellum evenly convex on margin; about one and three-fourths wider than long, its margin with one or two long bristles and numerous short, fine hairs. *Abdomen:* oblong, apparently more so than in present day species, which have the abdomen almost round. Only four segments including the first show with any degree of distinctness. There are faint indications of the outline of the fifth. The abdomen was uniformly dark in color with the possible exception of the basal half of the second segment. Much of the pigment is gone, but almost exactly the right posterior quarter of that of the second segment remains, and from the even gradation of this pigment-area's anterior margin it seems likely that the base of the segment was pellucid. *Legs:* wanting. *Wings:* well preserved in places. The anterior cross vein is quite before the middle of the discal cell. The costa ends quite beyond the tip of the wing as it should in the modern concept of this genus; the second and third longitudinal veins are, therefore, decidedly arched and convexed distally. The subapical cross vein is more or less evenly convex on its outer edge.

Locality: Florissant, Colorado. Horizon: Miocene.

Holotype: No. 3946, in the Museum of Comparative Zoölogy. This is the specimen referred to by Williston (1886).

Pipiza melanderi spec. nov.

Plate 2, fig. C

Female. Length 13 mm.; length of abdomen 7.5 mm.; of wing 7 mm. *Head:* quite globular, smaller than the thorax. The antennae set apparently a little below the middle of the head in profile, short, the third joint of moderate size, scarcely longer than wide. Arista not showing. *Thorax:* small, short, and broad and dark in color. The pile delicate and apparently erect and not very long. The outline of the scutellum, since the fly is a little bit twisted to one side, appears to have been less than twice as wide as long with an evenly circular margin. *Abdomen:* slender and preserved in such a way that there is a slight appearance of narrowness at the base. This is probably due to the partial sidewise position of the fly. Abdomen two and one-half times as long as wide, dark in color with a pair of basal pale-colored spots on both the second and third segments. These spots are odd in shape and rather widely separated. There is a trace of such spots on the fourth segment. Pile of abdomen fairly long and delicate. *Legs:* the hind femora are visible. They are slightly thickened and their pile, at least on the ventral part, is short but stiff. The tibiae practically as long as the femora but slightly arcuate. *Wings:* well preserved and with typical *Pipiza*-like venation. The marginal cross veins are slightly bowed inward near the middle and there is a suggestion of an inwardly directed spur. There is a short spur directed upwards towards the end of the vena spuria from the fourth longitudinal vein just before that vein joins the lower marginal cross vein. Small cross vein enters the discal cell barely more than a fourth the distance from the base.

Locality: Florissant, Colorado. Horizon: Miocene.

Holotype: no. 154, coll. American Museum of Natural History.

Pipiza venilia Heyden

Palaeontographica, **17**: 260. Pl. 45, fig. 28. (1870)

The description and illustration given by the author present the following points of interest and value.

Length 7 mm. The specimen lies upon its side so that the wing is partly obscured by the abdomen. The head is fairly large; the eyes are large and holoptic; the front is projecting and rounded. The antennae are wanting. *Thorax:* is longer than broad. The scutellum was about half as long as the dorsum of the thorax with entire unspined margin.

Abdomen: was elongate, twice as long as broad, and a little broader in the middle. Five segments are visible, the first four of almost equal length. There is some black pile posteriorly upon the segments. *Legs:* are almost wholly wanting; only traces of the femora are visible. *Wings:* the middle of the wing is clearly shown and the vena spuria is visible and determines definitely its place within the Syrphidae. Heyden states that the first posterior submarginal cell is prominent over the discoidal cell and the upper anterior angles of the first posterior cell is pointed; the small cross vein lies upon the basal side of the discal cell; the tip of the wing is not clear so that it cannot be seen if the submarginal cell is open or closed.

Locality: Rott, Germany. Horizon: Oligocene.

Type: One specimen in the Krantz collection. I was not able to locate the type.

This species is based upon a well preserved specimen, but since the living flies in the group Pipizini are especially difficult to classify and recognize, it is obvious that the type should be re-studied.

Genus Pseudopipiza subgenus nov.

Since the species *antiqua* is not strictly congeneric with modern *Pipizas* it seems to me sensible to place it in a separate genus. It cannot be determined definitely that the eyes are pilose though apparently they are. If so, this would be like modern *Pipiza* to this extent. The face is bulging out definitely about the region of the epistoma. The eyes prominent and face and head thickly hairy as in *Pipiza*. *Thorax:* convex, thickly, delicately pilose without macrochaetae. The scutellum large, semicircular but with the rim thin and much flattened in contrast to *Palaeopipiza*. The abdomen drooping as in *Pipiza* or *Palaeopipiza*, much convex but rather more densely pilose. The hind femora are a little more thickened and spinose perhaps, the apical cross vein is quite long and joins the third vein practically at tip of wing, more closely than in the living species.

Genotype: *Pseudopipiza antiqua* spec. nov.

Pseudopipiza differs from the present-day *Pipiza* in the face and in the confluence point of the apical cross vein being practically at wing tip. It differs from *Palaeopipiza* in the different face, very pilose head and thorax and the much thinned scutellar rim. In the latter genus the margin of the scutellum is thick and convex.

PSEUDOPIPIZA ANTIQUA spec. nov.

Plate 11, fig. 86; plate 13, fig. 113

Male. Length 4.5 mm.; length of wing 3.3 mm. *Head:* eyes touching broadly, apparently pilose. Antennae situated two-fifths of the distance from the top of the head. First two joints very short; third large, slightly subquadrate, barely longer below than wide. Arista basally thickened, slender on the apical half. Face below antennae very slightly concave for some distance, bulging out a little near the epistoma; not tubercular. Face, front, cheeks and occiput dark. Antennae brown, arista pale. Pile of entire head pale silvery, very thick on the face and cheeks, present on front. *Thorax:* and scutellum, dark in color, the margin of the scutellum very thin and impressed and the pile of scutellum and thorax everywhere quite long and delicate and very dense. *Abdomen:* drooping from the base, very convex and subcylindrical past the second segment; its pile thick delicate, subappressed, everywhere pale. Hypopygium large, rounded, prominent, together with the whole abdomen dark in color. Abdomen and thorax obviously shining or aeneous. *Legs:* hind femora somewhat thickened, with thick bushy pile above; a few bristly delicate spines, perhaps only bristles apically. *Wings:* with venation like *Pipiza*. Marginal angles of first and second posterior cells spurred, lower cross vein straight, apical one long, curved inward on the first half but is actually almost imperceptibly curved over its whole length, the curve upward, the last section of the fourth vein before the origin of the apical cross vein straight and a little longer even than the lower marginal cross vein.

Locality: Baltic amber, Germany. Horizon: Lower Oligocene.

Holotype: in the Geologisch-Palaontologisches Institut and Museum der Universität Berlin. I affix the number H 220 to the specimen. Allotype: H 221, female; same museum.

PSEUDOPIPIZA EUROPA spec. nov.

Plate 11, fig. 96; plate 13, fig. 121

Female. Length 5 mm.; length of wing 4 mm. *Head:* barely wider than thorax, hemispherical. The front wide and the eyes broadly separated even at the vertex. Antennae set below the middle of the head in profile; short; third joint moderately large, as long as wide and broadly rounded. The arista is a little longer than the antennae and is strongly thickened on the basal two-fifths. The face below the antennae is gently concave and has only a slight suggested protuberance about the oral margin. The face is short and not at all produced. The

cheeks, while not conspicuous are well developed. The occiput is very narrowly visible above and below. The posterior occipital margin viewed from above is shallowly concave. There is some short, sparse pile on the front and some longer, forward-directed, bristly hairs at the top of the vertex. The cheeks are short pilose. There seems to be a few erect hairs on the face, which are very sparse. *Thorax:* convex, short, erect pilose. The scutellum is short and small, its margin semicircular with some delicate, upturned-bristles on the margin. There are a few long, slender bristles on the calli and before the wing. *Abdomen:* nearly twice as long as wide and short pilose; the posterior segments are narrow and quite convex. The abdomen was apparently aeneous in life. *Legs:* hind femora short and quite slender with a barest suggestion of a thickening just past the middle; equipped ventrally and distally with very fine, sharp bristle-like spines. The hind tibiae are slightly arcuate and thickened distally and end transversely.

Holotype: a female in the Geologisch-Palaontologisches Institut und Museum der Universität Berlin No. H 221. Found in Baltic Amber (Lower Oligocene).

Chrysogaster antiquaria spec. nov.

Female. Length 5.0 mm.; of wing 3.8 mm.; of abdomen and scutellum 2.4 mm. *Head:* small dark colored fly, preserved in exact profile. The farthest projection of the face seems to be about one-third the height of the head from below, this seems to be sharply but obtusely angulate rather than tuberculate and below this point the face recedes away. Above this point the face recedes to the point of antennal attachment and above the point of antennal attachment the long front is rather convex but wrinkles cannot be seen. It must be admitted that in this specimen the point of attachment and characteristics of the antennae are open to two interpretations, since below the point of attachment as described, and arising from the angular point of the face, there is a slender attached body which may consist of two or three slender antennal joints. If this is true, the face just above the antennae is concave and the antennae would be situated very low upon the profile. This seems improbable. At the point of the face described as the locus of the antennae, the profile is slightly damaged, but a body does arise there which consists quite probably of the real antennae. Three joints can perhaps be made out. The first two joints are short and the third is oval, about two or two and a half times as long as wide. The fly belongs, therefore, to the subgenus *Orthoneura*. The eye

facets are not visible. *Thorax:* gently convex, a little sloping just in front of the head. Scutellum small and flat. No pile can be discerned on the thorax. *Abdomen:* fat, the tergite and sternite wide apart; obviously the abdomen was tumid with eggs. Six segments can be seen and there are others long drawn out and tapering, as characteristically precede the ovipositor of these flies, but they are obscured by other matter and the exact number is uncertain. No pile is visible. *Legs:* small and doubled up. They were mostly pale in color, the distal halves of the tibiae and the tarsi dark in color, the basal parts of the legs pale. Some fine hair can be discerned upon them. The hind femora is slightly thickened; it is about one and a half times, or less, as thick as its tibiae. *Wings:* hyaline; if infuscation was present it is not evident. The last section of the sub-apical cross vein joins the third vein nearly at right angles. It might be described as slightly recurrent. The venation is difficult to make out, but from one position, with the right slant, the more important details can be very well seen.

Locality: Florissant, Colorado. Horizon: Miocene.

Holotype: No. 12621, in the Museum of Comparative Zoölogy. This is the specimen mentioned by Williston (1886).

Genus Cacogaster genus nov.

Head: large and broad. Front and face quite wide and rounded in profile from above. Arjsta elongate and slender. The antennae apparently low upon the profile of the head since no trace of them shows. *Thorax:* broad and robust. *Abdomen:* short and wide, being shorter than in *Syrphus* but not quite as round and flat as in *Rhingia.* The pattern of the abdomen is unique and the many small isolated spots suggest patterns that are often seen in certain gadflies but not in Syrphids. *Wings:* venation *Syrphus*-like. Marginal cell open. Third longitudinal vein straight. Anterior cross vein well before the middle of the discal cell. Spurious vein present and extensive. Costa and third vein end at the tip of the wing.

Genotype: *Cacogaster novamaculata* spec. nov.

The particular characteristics of this form lie in the wide front and face, its convexity, and the short abdomen with its unique type of maculation. Better specimens are needed to place it finally in its phyletic position, but this can be said of many fossils since the key characters to exact position are usually so minute that they are seldom preserved except in amber.

CACOGASTER NOVAMACULATA spec. nov.

Plate 6, fig. 37

Sex indeterminate. Length 8.8 mm.; length of body and scutellum 5.2 mm.; length of wing 6.3 mm.; width of abdomen 3.0 mm. *Head:* very little detail shows. The eyes seem to be separated, antennae are not visible, both aristae appear, and are long and thickened; the antennae themselves were certainly quite short. *Thorax:* short and broad and dark in color. Very short pile present on thorax. Scutellum about one and three-eights times as broad as long. Margins simple, evenly rounded and without pile or bristles. *Abdomen:* with five segments and three others visible terminally. First segment dark, nearly covered by the scutellum. The succeeding three segments marked each with three subtriangular spots on the posterior border, a median one and one on each side, in each postero-lateral corner. The median spot on the second segment is largest and continuous as a band to anterior margin interrupting the segment; the median ones of third and fourth segments failing to reach the anterior margin and progressively smaller. The median spot of third segment almost an equilateral triangle. Second segment a little longer than third; third and fourth equal. Third segment two and three quarters to three times as wide as long. Abdomen covered with short decumbent dark bristly pile, somewhat thicker on the posterior part of fourth segment. *Legs:* hind femora moderately thickened, hind tibiae slightly so. Hind femora appears to be without spines or setae apically. Hind tibiae slightly thickened and covered with thick short ventro-decumbent bristly hair. *Wings:* these are of the Syrphine type. Marginal cell open. Third longitudinal vein straight; anterior cross vein well before the middle of the discal cell. Costa microsetose. Spurious vein evident, reaching almost to fusion of fourth longitudinal vein and postical cross vein. Third longitudinal vein practically straight until close to tip, then with a gentle downward concavity before joining costa at tip of wing, where costa ends. Second longitudinal vein joins costa at an angle of about twenty-five degrees.

Locality: Florissant, Colorado. Horizon: Miocene.

Holotype: no. 3940 in the Museum of Comparative Zoölogy. (Scudder collection.)

This is a very peculiar form which is so aberrant from any Syrphid type I am acquainted with that I hesitate to place it with *Syrphus*. The body is intermediate in shape between *Syrphus* and *Rhingia*; the maculation reminds one of a large group of *Tabanus* but of no Syrphids I have seen.

Myiolepta valida spec. nov.

Plate 11, fig. 89; Plate 12, fig. 97, 108

Female (apparently). Length 7.5 mm.; length of wing 5.6 mm. *Head:* large, wider than thorax; eyes conspicuous, rather widely separated, nowhere approximated. Antennae located about the middle of the head in profile, due to the position of the specimen the exact position of the antennae cannot be ascertained. Antennae short, third joint large, perfectly rounded, but little thickened, and flat on the sides. Arista three times as long as the third joint, strongly thickened basally and pubescent. Antennae dark reddish brown, face apparently without tubercle but deeply concave below the antennae and the epistoma bluntly protuberant. The antennae reaching almost to the epistoma and certainly reaching below the middle of the face in profile. Head very much obscured by whitish exuvia. *Thorax:* well preserved, thickly, short appressed setate. The sides of the thorax before the wing with four large stiff bristles, one such bristle on the mesopleura and three on the posterior calli; none on the apex of the dorsum before the scutellum but the margin of the scutellum has three pairs of exceptionally stiff heavy long bristles and a few weaker ones basally. Disc of scutellum with many short bristles. Margin of scutellum convex, form semicircular. *Abdomen:* short, broad, and robust, wider than thorax, together with the legs much obscured by white exuvia. *Wings:* nearly hyaline, very pale brownish, thickly long villose, the stigma a little bit darker. Vena spuria quite faint, small cross vein very little oblique above the vena spuria, joining the discal cell exactly one third of the way from base. Posterior basal angle of the lower marginal cell spurred, lower marginal cross vein straight, the posterior marginal angle of the first posterior cell without any spur, the subapical cross vein gently sinuous at first and then proceeding straight and acutely to join third vein practically at tip of wing.

Locality: Baltic amber, Germany. Horizon: Lower Oligocene.

Holotype: in the University Museum at Konigsberg. The specimen is not marked; the slide is marked S. I affix the Number H 104 to the slide. Paratype: no. 22195 in the British Museum of Natural History.

Myiolepta andreei spec. nov.

Plate 11, fig. 88; Plate 12, fig. 103, 105; Plate 13, fig. 114

Female: Length 6.5 mm.; length of wing 4.3 mm. *Head:* large, wider than thorax viewed from above. The head is rather thick, eyes

rather broadly separated, nowhere angularly approximated. Front a little produced but not conspicuous. Antennae situated in middle of head in profile, short, third joint large, broader than long, rounded apically; the arista but little longer than the antennae, strongly thickened on the basal half, pubescent; the entire antennae almost black. Face below the antennae distinctly concave. Epistoma not greatly produced. The face at this point being barely as long as third antennal joint, cheeks in profile narrow. Occiput strongly visible and conspicuous on the lower three-fourths of the eye margin but quite invisible above this point, its upper margin is set with stout spines, the lower part short pilose. *Thorax:* scarcely longer than wide, the posterior part of the thorax past the wings much narrower. Scutellum of moderate size, a little more than one and one-half times as wide as long, a little bit flattened, the apex subtruncate, the margin with a few short stiff bristles. Thorax without the second segment tapering gradually to the broadly rounded tip. Surface of abdomen short setaceous, with some longer pile at the sides and base of the second segment. Terminal segments very convex, color of abdomen light brown; subtranslucent, but this is probably due to the preservation. *Wings:* nearly hyaline. Stigma barely darker. Vena spuria very faint. The last section of the fourth vein before the origin of the apical cross vein is long but not quite as long as lower marginal cross vein, the latter slightly bent inward and its origin spurred from the fifth vein. Apical cross vein barely bent inward shortly after its origin, the remainder straight, joining third vein a short distance from tip of wing, but not as close to it as is usual in *Myioleptas.*

Locality: Baltic amber, Germany. Horizon: Lower Oligocene.

Holotype: in the University Museum at Konigsberg. The specimen is B 14586 and the slide is 14586. This species is named for the Director of the Konigsberg Museum.

Myiolepta germanica spec. nov.

Plate 11, fig. 91, 92; Plate 12, fig. 101, 106; Plate 13, fig. 120

Female. Length 8 mm.; length of wings 6.3 mm. *Head:* much broader than thorax, very large. Eyes conspicuous, bare, broadly separated, nowhere approximated. Front short pilose, pubescent only on the lower part. Antennae set at about the middle of the head in profile, short. Third joint large, a little longer than broad. Arista strongly basally thickened. Micro-pubescent. Face in profile quite concave, the blunt epistoma projecting and the face opposite the

epistoma produced about as long as third antennal joint. The face appears to be pubescent only. Facial strip broad, conspicuous, the crease deep. The occiput visible throughout in profile, rather strongly developed posteriorly on upper part of the head, with a few spinous bristles near the vertex. *Thorax:* convex, very short, setaceous, the bristles appressed. Scutellum quite large, a little more than twice as wide as long, the posterior part subtruncate. The disc a little flattened and a few quite short bristles on the rim. *Abdomen:* quite broad and robust, wider than thorax, a little longer than broad, much concealed by the wings. The pile short, much appressed and setaceous. A stiff surface patch of long bristly hairs very dense in the basal corner of the second segment. *Legs:* the hind femora slender, a little thickened in the middle and with only very short numerous spinous bristles ventrally. Hind tibia over three-fourths as long as hind femora, somewhat thickened posteriorly the hind basi tarsi about as long as remaining joints, and somewhat thickened. It is difficult to ascertain the correct proportions of the legs and their joints, due to the fact that the legs are either uniformly swollen in regular fashion or their contents have shrunken, faithfully reproducing them but with greater thickness. There appears to be a gaseous envelope about these limbs which, however, bears all the spines and bristles and armature and pile of each joint. It is therefore difficult to know whether the dark central contents have shrunken. Nevertheless, the pile and armament can be faithfully and correctly ascertained. *Wings:* with the outer marginal angles of the second posterior cell spurred, its cross vein straight, strongly directed away from wing margin and only a little longer than the last section of the fourth vein, the latter with mere trace of spur. Apical cross vein quite sinuous basally, then sharply drawn out toward tip of wing to join the third vein a short distance before the apex. Third vein and costa end at tip of wing. Vena spuria weak but not faint. Wings light brownish, stigma darker. The anterior cross vein joining the discal cell one-third of the way from base, the cross vein strongly oblique above the vena spuria.

Locality: Baltic amber, Germany. Horizon: Lower Oligocene.

Holotype: in the University Museum at Konigsberg. The specimen is No. B435 II and the slide is number 2435 (XII 2.200).

Myiolepta luhei Cockerell

"Probable length about 11 mm., wing 9 mm., or a fraction less; legs rather robust, black, with dark hair; a dark cloud traverses the wing

in the region of the forking of the veins 2 and 3, and above and below (the same is seen, less developed, in the living *M. varipes*); and venation agreeing with *M. varipes*, Lw., in nearly all respects. The following table brings out the venational characters:

"Second vein ending much nearer to third than to first. . . . . *M. bella* Williston

1. First posterior cell ending almost on margin of wing; outer side of discal cell nearly straight; fourth vein more strongly bent near end of discal cell . . . . . *M. luhei*, n. sp.
   First posterior cell ending some little distance from margin of wing; outer side of discal cell bent inwards; fourth vein less strongly bent near end of discal cell . . . . . *M. varipes*, Lw."

Locality: Baltic amber, Germany. Horizon: Lower Oligocene.

Holotype: Dr. Cockerell says "in the University Museum at Konigsberg." Since I was not able to locate the type of this species, I quote the description of Cockerell above. I believe that this species can be recognized on the basis of the dark cloud upon the wing.

Myiolepta woteni spec. nov.

Female. Length about 6 mm. *Head:* broad, rather less than hemispherical; upper portion of the front rather broad; the ocelli in an equilateral triangle; the pile of front delicate, abundant, pale in color. The face black without tubercle; the antennae blackish, rather large, the third joint about one and one-half times as long as wide. *Thorax:* black, with delicate, erect pile that is pale in color. There are no stout bristles on thorax or scutellum. The scutellum is broad, with an unusually well developed crimped or emarginate rim and only fine, erect, delicate pile. Along the margin the hairs are slightly longer. *Abdomen:* completely obscured by the preservation and the wings folded over it. It appears to be robust, about one and one-half times longer than its width and dark in color. *Legs:* easily seen from one side; black in color; the hind femora considerably thickened, at least twice as thick as the middle of the slightly flattened and slightly arcuate hind tibiae. This thickening of the hind femora is distributed over most of its length and it is narrowed shortly before its apex and base. On the ventral surface of the hind femora there is considerable short, stubby, slightly appressed, black pile but no spines. *Wings:* much of the venation is obscured by the preservation, but the marginal and submarginal, and first posterior cells and lower marginal and subapical cross veins are visible. The marginal cell is widely opened; the subapical

cross vein is long, with a gentle curve in its middle, directed proximally and is confluent with the third vein almost at the apex of the latter at the costa; the angle thus formed is quite acute. The last section of the fourth vein from end of lower marginal cross vein to the beginning of the subapical cross vein is quite long and is as long or longer than the lower marginal cross vein. I see no trace of a vena spuria in the lower portion of the first posterior cell but much of this cell is obscured and there may have been a fold or a trace of one in the proximal portion.

Locality: Baltic amber, Germany. Horizon: Lower Oligocene.

Holotype: one specimen no. 9080 in the Museum of Comparative Zoölogy: Haren collection.

This species appears to be distinct from others on the bases of the venation and the hind femora.

Genus Sericolepta genus nov.

Head: very large. Eyes strongly separated in the female. Front prominent, flattened, somewhat concave. Arista short, third joint large, a little longer than broad. Arista somewhat longer than the antennae, basally thickened, pubescent. Face deeply concave below the antennae, but the face itself is little produced. *Thorax:* longer than broad, convex, scutellum large, semicircular, its disc and margin convex, not thinned or impressed. *Abdomen:* quite robust, wider than the thorax, widest on the second segment. *Legs:* hind femora stout and elongate, a little the widest in the middle but not very narrowed either basally or apically, the ventral outer half equipped with many spines, much more than in *Myiolepta*. Tibiae about four-fifths as long as femora, stout and ending transversely. *Wings:* with marginal cross vein very long, the outer one strongly sinuous, joining the third vein some distance from the end of the wing. Vena spuria weak, anterior cross vein approximately one-third of the way from base, but quite oblique.

Genotype: *Sericolepta maculata* spec. nov.

This genus is, I believe, a well marked one; though it is like *Myiolepta* in many respects, the confluence of the very sigmoidal apical cross vein some distance from the tip of the wing is quite unlike that of the modern species of *Myiolepta* in the strict sense. Moreover, this is an exceptionally large species, over twice as large as present-day *Myioleptas* and without the flattened somewhat impressed scutellum found in *Myiolepta* or the appressed setaceous pile. It is worthy of

note, however, that two of the species that I describe and leave for the time being under *Myiolepta*, namely *andreei* and *germanica*, are somewhat like the present species in that the apical cross vein does not joint the wing at the tip and they are unlike both the present form and *Myiolepta* in lacking any spines on the femora. *Myiolepta valida*, appears to be a true *Myiolepta* beyond doubt. These other species and subgenera, it seems to me, we must regard as more highly developed inasmuch as the apical cross vein confluence point has moved more basalward.

SERICOLEPTA MACULATA spec. nov.

Plate 11, fig. 84, 85, 87; Plate 12, fig. 100, 109, 110; plate 13, fig. 119

Female. Length 13 mm.; length of wing 10 mm. *Head:* very large, wider than thorax. Eyes conspicuous, thickest somewhat away from the middle when seen from above. Front wide; eyes widely separated, nowhere approximated. The front flattened, somewhat concave, pilose only on the upper half. Somewhat protuberant at the level of the antennae. Antennae about the middle of the head in profile, short; third joint large, half again as long as wide, slightly pointed apically though the end is actually rounded. The arista elongate, less than half again as long as antennae, basal half strongly thickened and pubescent. The head from above, behind the eyes quite concave. The occiput at the top well developed, but not thicker than it is on the sides, with much long delicate pile and four or five spines that do not begin until near the middle of the head. Face below the antennae strongly concave, the epistoma bluntly protuberant. *Thorax:* very broad, somewhat longer than wide, thickly covered with very delicate erect pile. The scutellum large, semicircular, very convex with a few slender stiff hairs posteriorly, nowhere with macrochaetae. *Abdomen:* half again as long as wide, very broad and robust, the second and third segments black with large quadrate brownish yellow spots in the basal corners widely separated in the middle. The fourth segment appears to have been wholly dark, but it is difficult to say for sure. Abdomen thickly erect, long, delicately pilose at least on the basal half. *Legs:* hind femora stout and long, rather thickened especially right in the middle. On the basal half the hind femora are brownish yellow; on the outer half black, the outer half ventrally with very numerous short spines not confined to a single row. Hind tibiae rather stout, less than four-fifths as long as the hind femora, ending transversely. *Wings:* very long, considerably longer than abdomen. The marginal cross vein quite long, the lower one slightly sinuous, the outer one strongly

sigmoid joining the third vein some way from the tip though not remotely and the third vein and costa ending at tip of wing. The basal marginal angles of the first and second posterior cells with spurs. The vena spuria weak, but visible throughout. The small cross vein oblique above the vena spuria, and entering the discal cell about three-sevenths of the distance from the base. Wings uniformly brownish. Stigma darker.

Locality: Baltic amber, Germany. Horizon: Lower Oligocene.

Holotype: in the University Museum of Konigsberg. The number on the specimen is 2B642 and on slide is 2642 and 229.

Genus Archalia genus nov.

Head: large. Eyes small. The antennae are not well preserved; short and the third joint short and rounded. Face below the eyes extensive apparently and in profile retreating below the antennae. There is no evidence of a tubercle. *Thorax:* short and broad and robust. Scutellum large, apparently semi-circular. *Abdomen:* thick, convex posteriorly, very robust and with the terminal part broadly rounded in what is probably a male hypopygium. *Legs:* hind femora particularly short and massive, much as in the *Syritta* of today of an altogether different subfamily. Ventrally before the apex there are many small setae. *Wings:* venation well preserved. Small cross vein quite basal the vena spuria strong and the apical cross vein very sigmoid, and confluent with the third vein some distance from the tip of the wing. Third vein and costa join the wing margin at the tip. Marginal cell broadly open.

Genotype: *Archalia femorata* spec. nov.

This appears to be an unique fly. In general it is well preserved, the legs and wing particularly well preserved. The profile and details of the antennae are poor. This is the specimen which Williston (1886) referred to as related to *Myiolepta*. However, this relationship does not appear to be at all close. The anterior cross vein more basal, the confluence point of apical cross vein quite different and the massive femora make it unrelated. Its dark coloration and basal cross vein throw it into the Cheilosinae.

Archalia femorata spec. nov.

Plate 3, fig. B; Plate 4, fig. 10, 11

Male (apparently). Length 8.2 mm.; length of wing 5.6 mm. *Head:* the specimen is placed laterally and a fairly good profile shows. The

head is broad and short, and the front is round and bulging or prominent despite the face that it is extremely short and steep. The specimen, which is almost certainly a male had the eyes holoptic and the upper facets are enlarged. Below the antennae the face appears to be produced ever so little as a steep shallow convexity and then to retreat to the oral margin. The most remarkable peculiarity about the species seems to be the small eyes, leaving the cheeks and occiput well developed. The antennae were short, the first and second joints subequal, together a little longer than the third, and the third joint short and rounded. There is only an extremely faint indication of an arista. *Thorax:* dark in color. No details can be made out. The scutellum is short, smooth rimmed and quite broad. No pile or bristles appear. *Abdomen:* short and broad and dark in color, presumably without pattern, though this cannot be ascertained with certainty. Five visible segments and a large hypopygium. On the third segment there are traces of thick, moderately short hair. *Legs:* hind femora enormously thickened, about as in *Syritta*, with the same stoutness and type of thickening apparent in that genus. There is a double row of short heavy setigerous spinules along a ventral flange on the posterior two-fifths of the hind femora. At the point where these begin, the two-fifths way point, there is the not uncommon obtuse, outward production. The hind tibiae were very slender and closely applied to the femora, and were bent near the middle to correspond with the above mentioned production of the hind femora. The other femora and tibiae were slender. The legs appear to have been dark in color. *Wings:* characterized by widely open submarginal cell and practically straight third longitudinal vein with only the merest of sinuosities. The subapical cross vein is beautifully and strikingly sigmoid. The veins were quite heavy, and wing clear, and reaching a little beyond the tip of abdomen. The third vein joins the costa at the tip of the wing, and the first longitudinal vein joins the costa at an angle of about seventy-seven degrees.

Locality: Florissant, Colorado. Horizon: Miocene.

Holotype: No. 3941, in the Museum of Comparative Zoölogy. (Scudder Collection).

Genus Palaeoascia Meunier

Ann. Soc. Ent. France for 1893, 259 f. (1893). Ann. Soc. Sci. Bruxelles, **19**: 7 (1895)

Head: large, subglobular. Eyes occupying most of the head; broadly holoptic in the male. Front small, a little bit convex. Antennae short,

located in the middle of the head in profile, third joint not large. Arista a little longer than antennae, basally thickened. Face below antennae with well developed but small tubercle. Face below the tubercle descending a short distance to the epistoma, which is not more produced than the tubercle is. The occiput extensive throughout in profile in contrast to *Palaeosphegina*. *Thorax:* longer than broad, very convex, with a few short spines on the sides above the wings as in *Palaeosphegina*. Scutellum hemispherical, rather considerably broader than long, the apex with a single pair of widely spaced very strong tuberculous bristles and occasionally with a smaller pair on the outside. *Abdomen:* elongate, about two and one-half times as long as wide, rather thick, and somewhat convex on the surface, covered with somewhat scattered short appressed bristles. Male hypopygium large and rounded. *Legs:* the hind femora elongate, a little thickened especially on the dorsal surface, somewhat more slender than in *Palaeosphegina* in the males, with a double row of very long slender sharp pointed spines which reach practically to the extreme base of the femora. The outer lateral surface of the hind femora just past the middle with two to four similarly long sharp spines. Hind tibiae sometimes with a few spines near the middle of the outer surface. Absent in the type. *Wings:* with the venation very much like that of *Palaeosphegina;* so much so that I am at a perfect loss to find any difference not covered by the extreme venation of that genus. However, the wings of *Palaeoascia* do not seem to be quite so variable as *Palaeosphegina;* on the other hand they appear to be larger for the respective size of the insect.

Genotype: *Palaeoascia uniappendiculata* Meunier.

The genus constantly differs from *Palaeosphegina* in the matter of the swollen and tumid occiput. In addition the hind femora of the male is spinose on the basal half as well as distal half, the lateral femoral spines are constant in *Palaeoascia* but I believe that they sometimes occur in *Palaeosphegina* but rarely.

Palaeoascia uniappendiculata Meunier

Plate 5, figs. 16–20; Plate 7, figs. 43–48; Plate 8, fig. 51

Jahrb. Preuss. Geol. Landesanst., **24**: (2) 201. (1904)

Male. Length 5 mm.; length of wing 4 mm. *Head:* front, vertex, face and occiput flat, the front and the upper part of the face quite thickly pilose and this is in contrast to *Palaeosphegina*. The antennae located below the rather convex front, directly in the middle of the

head, are short, the third joint is about one and one-half times as long as wide with bluntly rounded apex and the color, including the arista, light reddish brown. *Thorax:* dorsum of thorax black. Scutellum reddish, the pile of the former is sparse but more abundant than that of *Palaeosphegina*, is quite erect and light in color. *Abdomen:* pigment of abdomen is destroyed in one type and largely obscured in another; in the third specimen the whole color is somewhat pallid, perhaps teneral. Nevertheless it is easily possible to see that the abdomen is banded with dark brown or black on the bases of all of the segments and a little bit more narrowly on the posterior margins. In one specimen, No. K5098, the whole of the terminal segment appears to have been black. *Legs:* hind femora definitely black on the basal half in specimen No. 2407K, and the base of the femora in this one yellow, the base of the tibiae, the basal two-thirds of the remaining tibiae and all of the fore and middle tarsi pale yellow. In the other specimens the color of the legs is somewhat uncertain and the femora appear to have been unicolorous.

Of the females it may be said that the front near the vertex is much narrower, as can be seen from Plate 9, fig. 35.

Locality: Baltic amber, Germany. Horizon: Lower Oligocene.

Types: in the University Museum at Konigsberg, from Baltic amber.

One male, No. K5098, 72247 (K5098-Klebs); another male which I judge is a type as it is labelled in Meunier's handwriting, but the number is not one of those given by him,—No. 2497k (2407-Klebs); and two females No. Z2086, K2631, (2631-Klebs); and 21692, K263B (2632-Klebs). The following twenty-six females have been determined as belonging to this species: No. B14 (14649-Klebs); No. 11B856 (2856, VII. 2.282-Klebs); specimen unnumbered (V); unnumbered (O); unnumbered (P); unnumbered (Y); unnumbered (I); No. 3345 (345,VII. 2.217-Klebs); No. XX134676 (24676-Klebs); No. B 19985(G); No. B446D (2446-VII. 2. 210-Klebs); No. B433 (433-VII.2. 212-Klebs); No. 5B393 (393 VII.2.209-Klebs); No. IIB546 (2546 VII. 2.202-Klebs); No. XB4555 (24555-Klebs); No. X127 (unmounted); No. X151 (unmounted); X144 (unmounted); X337 (unmounted); K 1930 (unmounted); K1939 (unmounted); K1984 (unmounted); No. 11 B 369 (2869); No. B 14681 (14681); No. B 4683 (24683) (front of this specimen very narrow at the top); unnumbered (Q) (I find this an extremely small specimen, which may be a distinct species. Length 4 mm.). The following ten males belong here: No. 3B593 (3995 VII 2.457-Klebs); No. 3B404 (3494 VII.2.219-Klebs); No. 492 unmounted) No. IIB363 (H 109); No. 11B785 (12785-Klebs); X4485, XB (4485-

Klebs); B14678 (14678-Klebs); unnumbered (W); No. 11B899 (2899 VII. 2.220-Klebs); No. 11 B 656 (2656).

In the Geologisch-Palaeontologisches Institut and Museum der Universitat Berlin are seven females as follows: T. M. B. 3 (H 201); specimen unnumbered (H 202); T. M. B. 10 (H203); 2 (H 206); 4 P.M.B. (H-208); P. M. B. 5 (H-207); P. M. B. 6 (H-210).

In the British Museum of Natural History are two females: no. 22194 and 22196 from the Loew collection, marked Miocene amber and with his label of 'Syrphici', and one male No. 22197 with the same designation, except the accompanying slip marked '*Syrphus*'.

Palaeoascia uniappendiculata brachypennis var. nov.

Female. This specimen I designate as a variety of *Palaeoascia uniappendiculata* on the basis of the broader and shorter wing, the proportions of which differ. The subapical cross vein is more sigmoid and the wing is a little bit more brownish. The legs are uniformly darker in color, nowhere light yellowish. Facial tubercle black. Pile of front not thick.

Holotype: in the University Museum at Konigsberg. No. B395 (395 VII.2. 216-Klebs).

Palaeoascia uniappendiculata obtusa var. nov.

Female. Length 3.5 mm.; length of wing 3.2 mm. In this form the tubercle of the face, while present, is so extremely blunt and perfectly straight between tubercle and antennae, suggesting the manner in which it is formed in *Palaeosphegina*, that I think it merits varietal distinction.

Holotype: a specimen in the University Museum at Konigsberg. The specimen itself is without number; the slide is No. 403 VII. 2. 210 Klebs).

Palaeoascia atrata spec. nov.

Plate 5, fig. 21–24.

Female. Length 5 mm.; length of wing 4.3 mm. *Head:* this is a very black species sharply distinguished, in addition to the jet black coloration of the entire face, tubercle, antennae and head, by the much more thickly and somewhat long pilose front and vertex. The face also appears to be more pilose and especially below the tubercle and

on the sides. The arista is strongly swollen on the basal fourth but not sharply swollen. The third joint of the antennae is at least half again as long as wide, perhaps a little more broadly rounded. *Thorax:* jet black, scutellum almost as dark. *Abdomen:* banded but quite dark, the basal fascia occupying nearly a third of the segment and no apical fascia on the fourth and fifth segments. *Legs:* dark brown or black. *Wings:* deeply tinged with brown throughout.

Locality: Baltic amber, Germany. Horizon: Lower Oligocene.

Holotype: in the University Museum at Konigsberg. The specimen is labelled B27261 (B27261-Klebs). Paratypes: a specimen unlabelled, slide No. 'B', Konigsberg; another specimen a male, British Museum of Natural History. No. XIII B327 (13327–353 In 18666).

I associate the following four specimens from Konigsberg with the species *atrata,* basing my conclusion on the similar blackish color, dark brown wings, long bristly pilose scutellum and thickly pilose front and blackish antennae. Two of them are males as follows: No. 11B885 (2885 VII. 2.197–Klebs); without number on the specimen (H 110–Klebs). The two females bear these numbers: the first XIIB788 (XIIB788); the second, lacking number on specimen but with the affixed letter of X, 2H111).

There is a large male, No. 3B620, which I believe is abundantly distinct from *atrata,* but because of the great variability of these flies, I prefer to leave it under *atrata* for the present. In the first place the antennae are much shorter, dark brownish, the third joint scarcely longer than wide, obtusely rounded, very thick and long pubescent. The arista sharply swollen on the basal fifth. The face and head everywhere jet black, the front rather thick, long pilose. The tubercle prominent, concave, and face above tubercle very hairy. Thorax and scutellum jet black and the scutellum in particular, in addition to the strong pair of heavy long spines, has a number of stiff, quite long black bristles on the disc. Its length is 5.2 mm.; of wings 4.2 mm.

The full number of this aberrant specimen which is in the University Museum at Kongisberg is No. 3B620 (3620 VII. 2.456 Klebs).

Palaeoascia nigra spec. nov.

Plate 7, fig. 49

Female. Length 4.8 mm.; length of wings 4.2 mm. *Head:* this specimen is distinguished by the very black coloration, sharp prominent tubercle on the face, the third antennal joint is one half again as long as wide, but is light reddish brown. This arista swollen on the basal

fifth rather sharply. The pile of the front is fairly long but certainly not as thick as found in *atrata* and the pile of the face is very sparse indeed. *Thorax:* jet black. Scutellum with only two strong spines and no long stiff bristles on the dorsum. *Abdomen:* is sharply banded with black on the third and fourth segment, and on the apex of the second segment and the base of the fifth segment. *Legs:* hind femora small, quite short, evenly thickened above and below but mostly in the middle, a little spindly at base with only two lateral spines and these are near the apex and very long and stiff. Only the apical third or two-fifths at most, of the hind femora are black and only the distal two-fifths of the hind tibiae. The middle femora pair of legs are entirely light yellowish brown and the anterior pair practically the same.

Locality: Baltic amber, Germany. Horizon: Lower Oligocene.

Holotype: in the University Museum at Konigsberg. The specimen is unnumbered, the slide is No. (N. H108).

Genus Spheginascia Meunier

Allg. Zeitschr. Ent. (B) **6**: 71. (1901). Jahrb. Preuss. Geol. Landesanst., **24**: (2) 205 (1904)

Small sized flies with a robust abdomen much like *Cheilosia.*

Head: large, eyes conspicuous, broadly touching in the male. Vertex and front long bristly, the latter with a deep median crease. Antennae short, third joint half again as long as wide, broadly rounded, very short pubescent, the arista quite long, thickened on the basal third but not abruptly, the apical bristles of the second segment quite long. Front above the antennae in the male convex. Face below the antennae in the male for a short distance concave, then rising to a strong and prominent bulge, broadly rounded. This bulge or broad tubercle descends equally abruptly to the epistoma. Face nowhere deeply produced. Face in the female below the antennae concave, only without the tubercle. The epistoma a little bit thrust forward, sharp at the edge. Occiput visible in profile only in the female. *Thorax:* scarcely longer than broad, convex, long sparse pilose. Scutellum at least twice as wide as long, the margin almost semi-circular, the disc and rim convex, although the scutellum is not thick. *Abdomen:* twice as long as wide, widest at end of second segment, barely less than half as wide at the end of fourth segment. Hypopygium large, broadly rounded from above. Abdomen rather long pilose, especially on the sides. *Legs:* hind femora slender, long bristly pilose on the sides and above and ventrally with many long stiff bristly spines, sharp pointed but

nowhere thick, not definitely confined to rows. *Wings:* characterized by the marginal cross vein being strongly and obliquely directed away from wing margin. Apical cross vein a little bit sigmoid joining the third vein remote from tip; never recurrent. Both the marginal angles of the first and second posterior cell with long spurs. Vena spuria present.

Genotype: *Spheginascia biappendiculata* Meunier.

Spheginascia biappendiculata Meunier

Plate 7, Fig. 50; Plate 9, Fig. 61, 66, Plate 10, Fig. 70, 71

Jahrb. Preuss. Geol. Landesanst., **24**. (2) 205. Pl. 13, fig. 4 and 5 (1904)

Male. Length 5 mm.; length of wing 4.5 mm. *Head:* eyes large, bare. The face, front and vertex dark brownish black. The antennae and arista very dark brown. The arista is strongly thickened on three-fourths of its length, more so at base. The pile of the front and face is black. *Thorax:* is black with some evidence of having been aeneus in life. The bristles on the dorsum of the thorax are very long, scattered and delicate on the upper part of the pleura. Before the wing there are several long stout stiff bristles and a few others on the posterior calli. They are not to be compared to the stiff spinous bristles of flies in the living genus *Ferdinandea.* The scutellum black, with two pairs of long stiff tuberculous bristles near the apex and some long, very sparse, slender, bristly hairs on the disc. *Abdomen:* uniformly dark brown, perhaps a little bit darker on the posterior segments of the abdomen and a little bit lighter on the dorsal half. Abdomen a little wider than thorax, the pile quite sparse but conspicuous, long and bristly. *Legs:* hind femora dark brown, a little lighter near the apex. All the tibiae dark apically and light yellowish brown basally. All the tarsi brown or fuscous.

Female. In the female the eyes are unusually broadly separated and the face is concave.

Locality: Baltic amber, Germany. Horizon: Lower Oligocene.

Types: in the University Museum at Konigsberg. One male, No. Z3874 (K2549, Z3874-Klebs). One female No. K4233, Z587 (K4233-Klebs). Paratypes: there is one male in the Geologisch Landesmuseum, Berlin from Baltic amber with no number on the specimen, the slide bearing the number (101).

I have determined the following specimens from the University Museum of Konigsberg: four males—No. 111B366 (3266 VII.2. 195-

Klebs); one specimen unlabeled, slide bearing the letter M, I affix the number H 112. No. IIB468 (2469 VII.2.250–Klebs); 11B563 (2563 VII. 2.203–Klebs). Six females—No. SB368 (368 VII.2.208–Klebs); No. 547 (unmounted); No. XB6335 (26335–Klebs); No. XIIIB311 (13331–(Klebs); No. X60 (unmounted; and one specimen without number, the slide bearing the number (13548 VI, 22, 7781–Phys. Oek. Ges.).

In the Geologisch-Palaontologisches Institut und Museum der Universitat, Berlin there are two females—No. 9 (H 205); and No. 7 P M B (H 209), and one male No. H 211. The British Museum of Natural History has three females—No. 22200, 22201 and 22202, which are from the Loew collection. In the American Museum of Natural History one Male No. 502–129.

Spheginascia biappendiculata rectinervis var. nov.

Male. Length about 5 mm.; wings 4.5 mm. This variety differs from the typical form in respect to the venation of the wing and the details of the scutellum. The scutellum has three pairs of strong, long, black bristles on the margin and one or two pairs of shorter ones near the base on each side. In the wing the angle formed by the lower marginal cross vein with the last portion of the fourth longitudinal vein is considerably more obtuse, the last section of the fourth longitudinal vein between the two cross veins is straight instead of curved downward, as is also the lower marginal cross vein.

Locality: Baltic amber, Germany. Horizon: Lower Oligocene.

Holotype: one specimen no. 9076, in the Museum of Comparative Zoölogy (Haren collection).

Genus Pseudosphegina genus nov.

Head: broadly subglobular in the male with the eyes narrowly separated a distance a little more than the width of the third antennal joint; no where approximated. Anterior facets a little enlarged. Eyes bare, the antennae set above the middle of the head in profile, small, the third joint a little longer than wide. Arista short, basally thickened and bare. Face below the antennae straight for a distance down to the conspicuous tubercle which lies nearly opposite the level of the bottom of the eyes. Face past the tubercle abruptly retreating, to the epistoma. Cheeks quite small. Occiput not visible in profile. The flanges of the lower part of the posterior surface of the occiput very

strong and conspicuous. *Thorax:* a little longer than wide, somewhat convex, almost bare with a few scattered short bristles. Scutellum small, wider than long, nearly bare with two strong apical bristles and a weaker pair on either side of these. *Abdomen:* elongate, about three times as long as wide, relatively thin at base and considerably thicker at apex due to the development of the hypopygium and genitalia. *Legs:* hind femora quite simple and slender with five or six well developed, spines ventrally on the outer half. *Wings:* rather longer than abdomen, not wider at base than in the middle. Apex somewhat rounded, the venation quite like that of modern *Sphegina* except that the vena spuria is quite absent.

Genotype: *Pseudosphegina dichoptica* spec. nov.

The genus *Pseudosphegina* is certainly of peculiar interest because it is in every way like modern *Sphegina* except that the face is tuberculate, whereas in all living *Sphegina* the face is concave and the face thrust forward. The genus *Palaeosphegina* of Meunier is somewhat misnamed for it is even less like modern *Sphegina;* in addition to having the face tuberculate the males were strongly holoptic and as is well known, the true *Spheginas* have only dichoptic males. Thus, out of the four possible combinations three of the combinations are known to have developed. Two of these exist as fossils. The third form *Sphegina* is not known positively to exist as a fossil, although I have placed a specimen in the genus *Sphegina* from the Florissant, from which specimen it can not be discerned whether the face is tuberculate or developed as it is in modern *Sphegina.* It may well be that the specimen of the Colorado form that I have placed in *Sphegina* is a true member of that genus but we must wait for other specimens to know what its face is like. The known combinations of face and eyes are as follows:

a. Face tuberculate; males dichoptic (*Pseudosphegina*).
b. Face tuberculate; males holoptic (*Palaeosphegina*).
c. Face non-tuberculate; males dichoptic (*Sphegina*).

Pseudosphegina dichoptica spec. nov.

Plate 6, Fig. 27–28; Plate 7, Fig. 38, 39

Male. Length 5.5 mm.; wings 4 mm. *Head:* the face, front and vertex black. Antennae and arista black, third joint of antennae a little pointed at apex, one and one-half times as wide as long. Arista half again as long as antennae, the pile of the occiput short, confined to a single row of collar-like bristly hairs. *Thorax:* black, pleura brownish,

the dorsum of the thorax exceptionally sparsely pilose, with only a scattered bristle here and there. Scutellum black, abdomen with the second, third and base of the fourth segment dark brownish, the remainder of the abdomen and the prominent rounded hypopygium shining black. Apical portions of genitalia light brown. *Abdomen:* everywhere thickly appressed bristly. Bristles of hypopygium erect and short, the last sternite thick bristly, the preceding ones with very few bristles. *Legs:* hind femora blackish brown on the apical half, paler brown basally, the outer half with a few stiff appressed bristles and five or six long stiff sharp pointed bristles ventrally. *Wings:* with the marginal angles of the first posterior cell long spurred, the corresponding angle of the second posterior cell with a merest trace of a spur. The lower marginal cross vein almost joining fourth vein at right angles, and last section of fourth vein before the origin of the apical cross vein quite long, longer than the apical cross vein itself. Apical cross vein somewhat curved or sigmoid, on its outer half joining the third vein at right angles, the last section of the third vein about five-sixths as long as subapical cross vein. Third vein and costa end at tip of wing. Wings uniformly pale brownish, the stigma darker.

Locality: Baltic amber, Germany. Horizon: Lower Oligocene.

Holotype: in the University Museum at Konigsberg. The amber bears no label. The slide upon which it is mounted bears the label of 'J'. I affix for future designation the number H 101 to the slide.

Pseudosphegina withersi spec. nov.

Plate 11, fig. 81, 82; Plate 13, fig. 115

Male. Length 6 mm.; length of wing 4.7 mm. *Head:* large, much wider than thorax. Eyes extensive, very narrowly separated indeed, more so than in dichoptica. Front and vertex and occiput, except narrowly below, dark in color. Face, antennae and cheeks light yellowish brown to brownish orange, the face a little darker, the arista quite pale yellowish. Tubercle well developed, pile of head everywhere pale, including the finely pilose occipital fringe. *Thorax:* convex, dark in color apparently aeneous, almost bare. Scutellum with two very stiff thick apical bristles; smaller bristles apparently absent and the dorsum almost bare. *Abdomen:* dark on the first and almost the whole of the second segment except for the apical band. Anterior half or more of third segment dark and the whole of the terminal segment. Hypopygium particularly large and broad and dark. Abdominal pile pale. *Legs:* hind femora brown, darker apically with few black spines,

four of them exceptionally long. Distal three-fifths of the hind tibiae dark, the whole of the middle pair of legs and all of the front pair of legs except the anterior basal two-thirds of the fore femora light yellowish brown. *Wings:* distorted but the apical cross vein very slightly curved and the last section of the fourth vein definitely curved outward slightly.

Locality: Baltic amber, Germany. Horizon: Lower Oligocene.

Holotype: in the British Museum of Natural History (Loew collection). The specimen is unnumbered, the box No. (22270).

Genus Palaeosphegina Meunier

Jahrb. Preuss. Geol. Landesanst., **24**: (2) 204. (1904)

Head: broadly hemispherical, the eyes extremely large occupying almost all of the head, broadly touching in the male, rather widely separated in the female, the width of the front above the antennae not quite twice as wide as width across ocelli. Ocelli at top of head in a nearly equilateral triangle. Front with only a very few scattered hairs and a small rounded convex tubercle above the antennae. In profile the back of the head from the ocelli down to the vertical portion of the head is very broadly rounded, the antennae are barely situated below the junction of the middle and upper thirds of the head. Antennae short, third joint large. Arista not quite twice as long as antennae, very slender at tip, strongly thickened at base. Face with a prominent tubercle that descends below a little bit more abruptly than the rise of the tubercle above. The tubercle is almost opposite the lower third of the eyes. Face very little produced below the tubercle, scarcely as long at the point of junction of cheek and face as the width of the third antennal joint. The occiput scarcely visible in profile but somewhat narrowly below, equipped with an occipital collar or fringe of pile of several rows of hairs. *Thorax:* barely longer than broad, very convex; it is practically bare or with scattered short hairs. The scutellum is large, semicircular, convex on disc and rim, with two to six very strong long bristles on the rim, the outer ones shorter. The scutellum seems to vary considerably in shape from circular to obtusely pointed. *Abdomen:* elongate, about three times as long as wide, widest distally on the fourth segment, the abdomen being spatulate rather than petiolate in most of the forms, sometimes flattened and again strongly convex. The pile of the abdomen is appressed, short bristly; the metanotum is conspicuous. *Legs:* the hind femora are always elongate, always a little thickened and this thickening is usually

past the middle; occasionally it is in the middle (specimen No. X 153). Without exception the distal ventral half of the femora is equipped with a double row of sharp stout long spines, and it should be noted that these spines never encroach on the basal half except as very slightly overgrown appressed bristles in contradistinction to *Palaeoascia*, in the male of which the spines are as strong on the base as they are apically. This is far from being an important difference, but it is one distinction between the two genera and I think it shows three things:

A. That the spinal armament originated from ordinary bristly setae.
B. That it began at the tip of the femora in all cases and moves basalward in a varying degree.
C. And lastly, that it has enjoyed a much greater impetus of development in the male sex.

The hind tibiae end transversely; the middle tibiae end with a series of blunt stout spines of which one is sometimes much longer and stouter. Wings: varying from elongate and slender to quite broad and short. There is always this uniform feature of venation that the marginal cross veins are strongly obliquely directed away from wing margin, leaving the last section of the fourth vein before the end of the wing, varying over one hundred per cent but never recurrent. Sometimes the apical cross vein is perfectly straight; more often sigmoid and occasionally quite strongly sigmoid. The vena spuria is absent but it must be remembered that it is quite faint in present day *Spheginas*. The males differ in no essential particular from the females, except for the strong holopticism, the prominent hypopygium and genitalia resulting in a little more petiolate abdomen.

Genotype: *Palaeosphegina elegantula* Meunier.

Palaeosphegina elegantula Meunier

Plate 9, fig. 63–65

Jahbr. Preuss. Landesanst. **24**: (2) 204, Pl. 13, fig. 2 and 3. (1904)

Female. Length 8 mm.; length of the wing 6.2 mm. *Head:* face, front and cheeks dark coppery brown to black. Antennae and arista light orange. The facial tubercle is large, evenly rounded, not quite as much produced as the cheeks. Occipital pile dense and light brownish in color. The third joint of antennae is one and one-fourth times as long as wide. *Thorax:* dark coppery brown or reddish above; there are faint indications of a trivittate condition. Scutellum brownish red,

lighter than the mesonotum, the spines of the thorax above the wing are quite short, the pleura are lighter in color. *Abdomen:* is light reddish or orange brown in color, in the type obviously banded but in this specimen the wings are matted over the abdomen and largely obscure it. Data taken from other specimens show that the basal part of each segment contains a narrow black or dark brown band of variable length and interrupted in the middle in more or less variable fashion. Sometimes the posterior portion of the segment is very narrowly dark fasciate as well but not interrupted. Hind femora dark reddish brown, nearly black on the outer half, much lighter in color on the basal two-fifths or half and very narrowly just before the apex. The hind tibiae a little darker on the distal half. All the tarsi reddish, the middle tibial spurs contain one very long stout spine. *Wings:* of average length in contrast to the extremes. The marginal angles of the first and second posterior cells both with very short spurs, or the distance from the confluence point of the apical cross vein to the end of the wing is about four-fifths as long as the apical cross vein. The last section of the fourth vein before the origin of the apical cross vein is longer than the apical cross vein. These remarks are chiefly taken from the type specimen on which the species is primarily fixed and I have indicated in the discussion of the genus the principal nature of the variations which are encountered in the individuals of this genus. There are probably several species involved in this complex, but in view of the tremendous variability I have had very little success in isolating these and in correlating the numerous differences. I prefer to leave them for the present as a group of variable individuals.

Locality: Baltic amber, Germany. Horizon: Lower Oligocene.

Type: in the Preussische Geologische Landesanstalt in Berlin. The specimen, labelled G. L. 99, was studied. There is supposed to have been another type at the University of Konigsberg, which, however, I was not able to locate; but there certainly were other numerous specimens in their collections, all of which I have before me at time of writing. These total thirty-three specimens not including one each of two varieties nor the specimen of uncertain determination.

The specimens from the University Museum at Konigsberg are as follows:

Females, specimen IIB857 (2857 VII. 2.284-Klebs); No. 14708 (14708-Klebs); No. B901 (VII. 2. 217-Klebs); No. B14285 (14285-Klebs); No. IIB662 (2662.Vii.2.287-Klebs); No. X122 (unmounted); No. X161 (unmounted); No. X120 (unmounted); No. X164 (unmounted); X529 (unmounted); No. X 124 (unmounted); No. K2416-

343 (unmounted); No. X IIB786 (13786-Klebs); No. 16562 (16562); No. XB4365 (24365-Klebs); No. 14287; No. K 7871; the following nine specimens have no number of the specimen but the slides are designated thus: No. (E); (R); (H); (A): (340); (H 106); (T); (Z); (L). Seven males: No. IIB915 (2915 VII.2.195-Klebs); No. IIB900 (2900 VII.2.922-Klebs); No. X153 (unmounted); No. X 331 (unmounted); No. X 336 (unmounted); No. X111B228 (13228-Klebs); no number on the specimen, the slides labeled (U). There is also at the Geologische-Palaontologisches Institut und Museum der Universitat Berlin one male No. T. M. B. (H 204), and one female at the British Museum of Natural History No. XIIIB229 (13229, 351, In 18664), and one female at the American Museum of Natural History; all of these have been studied by me.

With regard to the following specimen, No. B14138 (14138-Klebs), I cannot positively decide whether or not it is a male or a female; if it is a female it would go into the genus *Paleosphegina* since it is definitely dichoptic. Should it be a male, on the basis of the hypopygium (which is obscure) it would go into the genus *Pseudosphegina*. The evidence which is available from the terminal portion of the abdomen indicates a female. Specimen at the University Museum, Konigsberg.

Palaeosphegina elegantula tristis new variety

Female. I designate this as a variety based on the extremely narrow front. The antennae are dark brown and the quite short arista sharply thickened on the basal third. The front and vertex are almost black; scutellum black; the legs dark brown, with the tarsi somewhat lighter. The hind tibiae pale on the basal half.

Locality: Baltic amber, Germany. Horizon: Lower Oligocene.

Type: specimen without number in the University Museum at Konigsberg; the slide is numbered F H107.

Palaeosphegina elegantula atrox var. nov.

Male. Size large. *Head:* face, front and cheeks jet black. First antennal segment black, third very dark brownish. Arista sharply and heavily thickened on the basal fifth and quite pubescent on the basal fifth. *Abdomen:* with first two segments and the base and apex of third and of all the very long fourth segment and basal part of hypopygium jet black. The third segment has a very brown yellowish band. *Legs:* the hind tibiae sharply jet black only on the apical third. Hind

femora jet black past the middle except narrowly at the apex. Remainder of the legs entirely pale yellowish.

Locality: Baltic amber, Germany. Horizon: Lower Oligocene.

Type: specimen in the University Museum at Konigsberg, number 11B891 (2891 VII.2.215-Klebs).

Palaeosphegina pilosa spec. nov.

Female. Length 5.2 mm.; length of wing 4.2 mm. *Head:* very large, much wider than thorax; everywhere, face antennae and the arista jet black. The pile of front pale brownish, nowhere thick. Face apparently with a little short pile above the tubercle. Tubercle rather large, formed as in *elegantula*. *Thorax:* and scutellum shining jet black. Pile of both of these very sparse, nearly bare, a few long black bristles before the wing, and scutellum, with two pair of unusually thick stiff bristles which are long, the inner pair widely spaced, and in closing a pair of very short bristles. Outer pair shorter. *Abdomen:* broadly petiolate, jet black with black appressed short bristles. *Legs:* everywhere jet black, the bristles on the femora confined to the apical half, one long and one short bristle on the outer lateral surface of the hind femora, a short distance from the end. *Wings:* very brownish. Stigma extremely dark. Apical cross vein rather sigmoid, both the marginal angles of the first and second posterior cells spurred.

Locality: Baltic amber, Germany. Horizon: Lower Oligocene.

Holotype: in the University Museum at Konigsberg, number B331 (331 VII 2.206-Klebs).

This species has the occiput and facial tubercle quite as expected for *Palaeosphegina*. It is a slightly smaller species, the form a little bit more suggestive of *Palaeoascia* and the lateral femoral spines suggest *Palaeoascia*. From *elegantula* Meunier it is at once distinct in the totally black coloration, besides the smaller size and the arrangement of the spines on the scutellum.

Palaeosphegina baccha spec. nov.

Female. Length about 4 mm. *Head:* large, considerably wider than thorax; hemispherical in shape; the occiput slightly swollen when viewed laterally and broadly pilose. The vertical posterior ocular margin straight and not indented. Ocelli set in approximately an equilateral triangle; the smooth, short pilose front widening gently down to the antennae which are set above the middle of the head in profile. There is a small tubercle on the face below the antennae. The

first and second joints of the antennae are quite short, the third joint is broadly rounded, a little longer than wide with a slender dorsal arista that is slightly thickened on the basal third. *Thorax:* black, sparsely short pilose, scutellum of the same color, with a pair of rather widely separated blackish bristles which are about as long as the length of the scutellum. *Abdomen:* elongate and rather flat, slightly crumpled. Five segments are present; the third, fourth and fifth have a dark colored transverse band or fascia lying across the base of the segment, its width comprising about two-fifths the length of the segment. Upon the third segment the lateral width of the fascia appears to occupy a little more than half the length of the segment and on this same segment the fascia appears to be interrupted in the middle truncately. The nature of the first and second segments can not be ascertained. *Legs:* light brownish yellow in color, the hind femora are simple and slender. *Wings:* the apical third of both wings is destroyed. From the remainder, the venation can be described as follows: a wing suggesting *Palaeosphegina* in the absence of the spurious vein and in that the last section of the fourth vein is quite remote from the subapical cross vein, in fact, almost recurrent; the lower marginal cross vein is quite straight, making a right angle with the last section of the fourth vein and about a 70 degree angle with the fifth vein.

Locality: Baltic amber, Germany. Horizon: Lower Oligocene.

Holotype: one specimen no. 9029 in the Museum of Comparative Zoölogy (Haren collection).

There can be very little doubt of the family affinity of this specimen, although the disposition of the subapical cross vein and of the second and third longitudinal veins can not be determined. The preserved portion of the right wing is a little greater and a little longer than that of the left one and is truncated obliquely from along the costa just at the end of the first longitudinal vein. All of the outer half of the subcostal cell dark brown; the venation of this wing is not greatly different from that of other specimens of *Palaeosphegina* except that the discal cell is very much longer than usual; the lower marginal cross vein more recurrent; the fly itself appears to be more slender; the head perhaps larger and the hind femora appear to lack the slender bristly spines characteristic of *Palaeosphegina.*

Palaeosphegina fumosa spec. nov.

Male. Length 5 mm.; wing 4.3 mm. *Head:* hemispherical, entirely black in color, eyes touching for about half the length from vertex to

antennae; the pile of front and upper part of face above tubercle black in color, rather abundant and dense; the occipital pile is also black. Tubercle of face small but well developed; eyes bare; the antennae dark brownish black, the third joint about one and one-third times as long as wide; the black dorsal arista thickened on the basal fifth; slopes of the face below the tubercle without pile. *Thorax:* and scutellum black with sparse delicate pile. The scutellum is rather long, apparently almost as long as wide, with a pair of rather close-set, long, black bristles arising from the apical margin. *Abdomen:* the color can not be positively ascertained; the first three segments are almost wholly dark brown and translucent, as is much of the right half of the fourth segment, but on the greater part of the fourth segment there is an extensive black pigmented area and there appear to be traces of such pigment on the more obscured portions of the basal segments, hence it is entirely probable that the abdomen was black in color; it is overlaid by the smoky right wing. The sternites of the fly are certainly brownish yellow in color. The hypopygium appears to have been large and well developed with lobes and processes, resembling Recent *Sphegina* in this respect; these structures can not be determined because of overlying, glistening air spaces. *Legs:* dark reddish brown, the hind femora slender, very little thicker than the other pairs; apical three-fifths black in color and the lateral, ventral margin equipped with ten widely spaced, rather long and slender black bristly spines which begin not far from the base of the femur. *Wings:* venation beautifully preserved; the entire wing smoky grey; stigmal cell yellowish brown; the subapical cross vein joining the third vein at right angles with a rounded bend just before it joins the third vein and its initial section straight. The first section of the fourth vein straight and quite long; a little longer than the lower marginal cross vein and equal in length to the last section of the third vein, running from wing tip back to subapical cross vein.

Locality: Baltic amber, Germany. Horizon: Lower Oligocene.

Holotype: one specimen, no. 9075 in the Museum of Comparative Zoölogy (Haren collection).

Sphegina abrasa Théobald

Les insectes fossiles des terrains oligocènes de France, 1937, p. 243; pl. 18, fig. 12.

Head: The base of the head preserves some traces of black; it is semi-circular and as large as the thorax. The eyes are bare, large,

projecting and of an oval shape. The face is flattened or depressed and the antennae are narrowly visible. *Thorax:* The body of this insect is of a reddish yellow coloration. The thorax is elongate, subrectangular, the corners rounded, the scutellum rounded posteriorly. *Abdomen:* clearly demarcated from the thorax, swollen and inflated into a club which is more extensive in length than the thorax; four segments are visible, the fourth of a darker color than the preceding ones. The body is covered with a fine pubescence. *Legs:* slender, finely pilose; the hind femora are swollen and carry two rows of spines. *Wings:* the venation is well preserved except towards the apex of the wing. The subcosta ends toward the middle of the anterior border; the R is elongate, the Radial sector is bifurcate, joining itself to 'M' through a transverse vein; 'M' bifurcate, "une cellule discoidale", the anterior branch of 'M' joins itself to 'Rs'; 'Cu' bifurcate, joining itself to 'M' (v. Figure). Dimensions: entire length- 8 mm.; wing- 5 mm.

Relationships: the venation of the wings is that of the Syrphidae. In the genus *Sphegina* the third femur is swollen and *arme* Brun. of India has the wings of the same color.

The author notes that Foerster has described *Syrphus reciprocus* in slabs of Brunnstatt. This species lacks the wing in his single individual specimen. It measures 6.5 mm.; perhaps it is identical with *Sphegina abrasa.*

Locality: Kleinkembs, France. Horizon: Oligocene.

Holotype: R 186. Coll. Mieg. Mus. Bâll. I have not seen the type; I give above restated and rearranged the important particulars from the author's description.

Sphegina obscura spec. nov.

Plate 4, fig. 1–3

Female (apparently). Length of the abdomen 7 mm. *Head:* and front half of thorax missing. This is an obscure specimen, but the shape of the abdomen and details of the femora can be made out fairly well. *Thorax:* scutellum large, with strongly and evenly convex margin, almost hemicircular, one and one-half times wider than the second segment at its smallest width. *Abdomen:* considerably constricted and petiolate. The last two segments flared and expanded, as is typical in the genus. The figure gives some idea of the relative shape and proportion of the segments. There are traces of spots in the third and fourth segments. It will be seen that the shape of the abdomen is not greatly different from *Sphegina infuscata* Loew. *Legs:* hind femora

thickened, but not spindle-shaped, the thickening begins quickly and ends more or less abruptly, although the taper, as in many species, on the distal end of the femora is gentle. There is a series of strong spines arranged on the distal ventral part of the hind femora. The distal third appears to have been dark in color. *Wings:* not easily discernible. The fore part of the wing is best preserved and the convexity of costa, and of second and third longitudinal veins is a matter of interest.

Locality: Florissant, Colorado. Horizon: Miocene.

Holotype: No. 3947 in the Museum of Comparative Zoölogy. This is the specimen seen by Williston (1886).

Genus Eoxylota genus nov.

This form differs from *Hemixylota* Shannon in the slightly tuberculate face and in the presence of the very numerous short spines on the ventral part of the hind femora. The apical cross vein is less sigmoid in *Eoxylota* and the margin of the scutellum in *Hemixylota* is distinctly impressed. From true *Xylota, Eoxylota* is at once distinguished by the cross vein being basal and by the small tubercle.

Genotype: *Xylota pulchra* Meunier.

Meunier described it in the genus *Xylota.* Because of the slightly tuberculate face and the strongly basal cross vein, I am obliged to remove it from *Xylota* and I place it in the genus *Eoxylota.* In many respects it resembles the Chilean genus recently described by Shannon, *Hemixylota,* which is like the present form, with the basal cross vein throwing it out of Xylotinae and into Cheilosinae, in the modern sense. It is very odd that this genus should find its nearest living relative in Chile. I have recently seen a specimen of *Cyrtid* fly from the Bernstein fauna which also finds its nearest living relative in Chile and South Africa, bearing a mute witness to the flight of time necessary for such present isolated distribution. *Eoxylota* strictly speaking differs from *Hemixylota* only in the somewhat tuberculate face, slight differences in wing and facies. I have compared it with a specimen of the genotype of Shannon's genus kindly sent to me by Dr. Edwards.

Eoxylota pulchra (Meunier)

Plate 6, fig. 29–30; Plate 10, fig. 72–73

Jahrb. Preuss. Geol. Landesanst., **24**, (2): 207. Pl. 13, fig. 6 and 7 (1904)

Male. Length 11 mm.; length of wing 8 mm. *Head:* broadly oval, eyes very large, touching in the male but not for a great distance. The

front small, black, flattened, somewhat protuberant at the level of the antennae. Antennae located above the middle of the head in profile, first two joints short, third not very large, half again as long as wide, rounded apically, the arista short, thickened throughout, strongly on the basal half. Face deeply concave below the antennae, apparently with a small tubercle lying a short distance above the epistoma. The junction of the cheeks and face is quite angular and obtusely ridged, but scarcely more produced than the face at epistoma. *Thorax:* is broad, longer than wide, considerably flattened, with a few stiff bristles on the sides at base of wing. The mesonotum with thick delicate quite erect pile, in color uniformly black. Scutellum large, rather elongate, not quite twice as wide as long, the disc considerably flattened, erect pilose, the margin with about six pairs of long stiff tuberculous bristles; the apex seems to be rather thin, its color uniformly black. *Abdomen:* elongate, two and one-half times as long as wide, widest at the end of the third segment. Second, third and fourth segments subequal in length, the latter rather broad at the apex, but little narrowed and convex only on the sides. The hypopygium wide, broadly rounded and not greatly visible from above. The surface of the abdomen as a whole quite flattened, uniformly dark in color, appressed setaceous in the middle, erect pilose on the sides. *Legs:* the hind femora elongate, a little bit stout, not thickened, the whole ventral length with numerous short sharp spinous bristles, the femora black, narrowly reddish apically, the tibiae almost entirely light brownish red, a little bit darker, narrowly, in the middle. Tarsi light reddish brown, the hind tibiae much widened apically, pinched in before the apex, with many stout short terminal bristles or setae. *Wings:* elongate, longer than the abdomen, uniformly tinged with brown. Stigma darker. Vena spuria very faint; small cross vein a little oblique, long, entering the discal cell about three-eighths of the way from the base, the marginal cross vein long, almost paralleling the wing margin. Cross vein long, almost paralleling the wing margin, the outer one joining the third vein some distance but not remotely from tip. The basal marginal angles of the first and second posterior cells short, spurred; the last section of the fourth vein before the origin of the apical cross vein somewhat long, but only a third or less than the length of the apical cross vein.

Locality: Baltic amber, Germany. Horizon: Lower Oligocene.

Type: No. 8 in the University Museum at Konigsberg.

The above description as well as the illustration I give are taken from the type specimen. In describing this species, he makes much of the curious, irregular, jagged-edged spots on thorax and abdomen.

Unfortunately he mistook for a definite pattern what is only the fragmented condition of the surface pigment. This species is a uniformly blackish fly without pattern or marks.

The Subfamily CHRYSOTOXINAE

This small subfamily has at most but two living genera, but the genus *Chrysotoxum* itself, is a world wide aggregate of many species, all of them with a characteristic appearance. The fly described below is the only fossil insect that has yet appeared that seems to show any relationship to *Chrysotoxum*.

Genus PROTOCHRYSOTOXUM genus nov.

Large flies with prominent robust, very convex abdomens, much as in present day species of *Chrysotoxum*. Apparently there are narrow, basal, light colored fascia on the segments. The small cross vein is located well before the middle of the discal cell. The third longitudinal vein is straight whereas it is curved in *Chrysotoxum*. The head is wanting in the specimen and cannot be described. It is sufficiently well preserved, however, so that additional specimens, if they are ever found can be recognized.

Genotype: *Protochrysotoxum sphinx* spec. nov.

PROTOCHRYSOTOXUM SPHINX spec. nov.

Plate 2, fig. A

Male. Length 12.5 mm. *Head:* large, rounded, more or less subglobular, not quite as wide as thorax; no details of antennae visible. *Thorax:* dark, broad; scutellum obscure, apparently quite large with a circular rim. *Abdomen:* very large, evidently quite convex with emarginate rim. Four segments and the tip of a fifth visible. The abdomen is dark, short, stiff pilose and on the base of the fourth and fifth segment, particularly on the sides, there appears to be a pair of spots wedged-shaped, with a straight posterior edge, the acute portion of the wedge turned inward. *Legs:* absent. *Wings:* preserved in fragmentary fashion. The vena spuria is well developed, the whole of the discal cell is visible and the small cross vein enters this cell practically at the middle, its upper portion is strongly oblique. The lower marginal cross vein is upright on the basal portion and then is acutely drawn out

to join the fourth vein, the last portion of which is drawn down to meet it. The outer cross vein, while not erect on the basal half approaches this condition and gives off an inward spur and then is drawn out acutely but its confluence point and the tip of the wing are not visible.

Locality: Florissant, Colorado. Horizon: Miocene.

Holotype: No. 159, coll. Amer. Mus. Nat. Hist.

The Subfamily EUMERINAE

I place here Meunier's genus *Palaeopipiza*, which bears very little relation to *Ascia* (now *Neoascia*) and also my own genus *Doliomyia*. It seems to me the wings of these two flies suggest *Eumerus* in venation, as does the large, slightly quadrate third antennal joint, low set antennae, and much thickened arista, and straight and subconcave face types. Nothing is lacking but slight further changes in the wing and the development of megamorphic femora.

Genus Palaeopipiza Meunier

Ann. Soc. Sci. Bruxelles, **26**: 103, fig. 6. (1902); Jahrb. Preuss. Geol. Landesanst., **24**: 209 (1904)

Head: eyes extensive. Condition in the male unknown. The back of the head in profile very rounded and convex. Antennae set about the middle of the head in profile, possibly a little below. The antennae short, the first and second joints particularly so, the third joint very large, flat, a little longer than broad, slightly more developed on the ventral surface leaving the joint somewhat asymmetrical but not exactly quadrate. Arista set in the middle of the upper surface midway between the base and end, very short, two basal segments visible and grossly thickened throughout although the tip is slender; surface pubescent. Face below antennae distinctly concave, flat to the level of the eyes, the epistoma a very little produced and rounded. Front apparently bare. Face with some sparse pile. Occiput well developed behind the ocelli and for a short distance along the eyes then scarcely visible. *Thorax:* quite short, as broad as wide, at least convex; short pilose without macrochaetae. Scutellum quite large, perfectly semicircular. Margin convex, with a few slender bristles, only the apical two of any length. *Abdomen:* not quite twice as long as wide, broad basally. Scarcely less broad at the beginning of the fourth segment at

which becoming very convex, it tapers to the narrowly rounded tip of the fifth segment. Abdomen everywhere short pilose, except at basal corners. Posterior pile appressed. *Legs:* hind femora short and slender. I cannot discern if spines are present. Hind tibiae as long as femora, considerably thickened on the outer three-fourths. *Wings:* venation as *Palaeoascia*. The apical cross vein much longer, parallelling wing margin, joining third vein not far from tip. Vena spuria appears to be faintly present; this is uncertain.

Genotype: *Palaeopipiza xenos* Meunier.

Palaeopipiza xenos Meunier

Plate 8, fig. 55–57; plate 13 fig. 117

Ann. Soc. Sci. Bruxelles, **26**: 103; fig. 6. (1902). Jahrb. Preuss. Geol. Landesanst., **24**: (2) 209 (1904)

Female. Length 6 mm.; length of wings 4.7 mm. *Head:* the eyes apparently dark in color. Antennae dark brown, the third joint orange brown in parts. Arista brown, the pile of the face white in color. The front at the region of the antennae is very little prominent. Concavity of the face not very deep. There are a few long pale bristles about the ocelli and some still longer dark bristles on the vertex behind the ocelli. *Thorax:* and scutellum dark in color, apparently aeneus, the pile everywhere pale and the bristles of the scutellum pale. *Abdomen:* concolorous with the thorax throughout. The sides of the segments very narrowly yellow, the pile of the abdomen without exception everywhere pale. *Legs:* femora black, possibly aeneus; the bases of the tibiae to a varying extent, on the hind tibiae almost the whole, dark brown, remainder brownish yellow. *Wings:* somewhat brownish, the stigma a little darker.

Locality: Baltic amber, Germany. Horizon: Lower Oligocene.

Type: in the University Museum at Konigsberg. No. K4304, 2492 (K4304-Klebs).

Genus Doliomyia genus nov.

Small short robust species. *Head:* large, barely wider than thorax, not very elongate nor yet is it flattened, the males probably holoptic, the front long, very convex in profile. The antennae distinctly set above the middle of the head in profile, quite short but the third joint very large, suborbicular. The arista somewhat longer than antennae basally, thickened but not conspicuously, bare and slender pointed.

Face below antennae perfectly straight, gently retreating. Cheeks practically nonexistent, so that at the epistoma the face is only half as long as the third antennal joint. Occiput tumid for a short distance above and close to the vertex. *Thorax:* about as long as wide, the scutellum short and quite wide, a little over twice as wide as long, the disc convex and the rim narrowly emarginate and impressed, without strong bristles. Dorsum of thorax and scutellum exceedingly short microsetate. *Abdomen:* short and broad, barely wider basally than the thorax, convex and very short microsetaceous. *Legs:* femora short, slender, not thickened and with short setaceous bristles instead of spines ventrally. *Wings:* a little longer than abdomen, broad basally and broadly rounded at apex. The third longitudinal vein ending with costa a little beyond the tip of the wing. The lower marginal cross vein straight, directed considerably away from the margin of the wing and thus oblique rather than parallel. The last section of the fourth vein before the origin of the apical cross vein quite long, the apical cross vein angulate a little before the middle, the angle directed inward but without spur. The confluence of the apical cross vein with the third vein is not very far from the tip, but the remaining distance of the third vein to the tip of the wing is about one-fourth of the length of the apical cross vein. Both the basal angles of the first and second posterior cells spurred. Wings villose throughout. Vena spuria very faint if not actually absent.

Genotype: *Doliomyia chalybea* spec. nov.

This genus differs from Meunier's *Palaeopipiza* in the fact that the antennae are definitely located above the middle of the head in profile. The arista of *Palaeopipiza* in contrast to *Doliomyia* is very short, strongly thickened basally, pubescent and not very slender on the apical half. The third joint of *Palaeopipiza* is somewhat truncate on the dorsal area and the face somewhat concave in profile. The abdomen of *Palaeoascia* is elongate, very convex, strongly drooping from the base and is suggestive of *Paragus* (Recent genus). The subapical cross vein is not strongly angulated; both of these genera remind one very closely of the genus *Eumerus* among Recent Syrphids. The wings of *Doliomyia*, the large third antennal joint, the shape of the face all suggest *Eumerus*. They are sharply distinct from *Eumerus* through the absence of a grossly thickened, swollen hind femur, with its denticulate, ventral apex and from *Citibaena*, a close relative of *Eumerus* with slender femora, again with the absence of spines on the femora and the quite bare eyes. In *Citibaena* the eyes are densely long pilose.

Doliomyia chalybea spec. nov.

Plate 8, fig. 58–59; Plate 9, fig. 62; plate 13, fig. 116

Female. Length 6 mm.; length of wing 5 mm.

Head: broad. Face, front and vertex black in color, the antennae very dark brown to black. Arista black. Pile of front very short, becoming still shorter before the antennae, but if bare at any point it would be very narrowly before the antennae. Pile of vertex about the ocelli a little bit longer, the occiput on the sides very short pilose and short pilose below. I cannot distinguish any pile on the face. The face is well preserved and so it is quite possible the pile was absent or if present was only in the form of micropubescence. *Thorax:* and scutellum jet black, the pile exceptionally short without macrochaetae anywhere. There is a narrow, convex, impressed margin on the extreme end of the dorsum of the thorax just before the scutellum. One specimen suggests that the thorax was dark shining bluish. *Abdomen:* dark blackish in color and all of the legs dark black. *Legs:* the tibiae a little bit lighter perhaps and the apical joints of the tarsi light brown. *Wings:* strongly infuscated and smoky throughout, the stigma darker.

Locality: Baltic amber, Germany. Horizon: Lower Oligocene.

Holotype: specimen No. B16788 (Slide no. 16788) in the University Museum at Konigsberg.

Paratype: a specimen labelled B438 (slide numbered 438). Both are from the collection of Dr. Klebs.

The Subfamily MICRODONTINAE

Serres assigned a species to this subfamily in 1829, which he neither described nor illustrated; since he did not give a type number, I have been unable to trace the specimen. I am inclined to believe he was right in his placement, for *Microdon* is so characteristic, that it is difficult to see how he could have been mistaken. Perhaps no single fossil would be as interesting as this one, for the subfamily Microdontinae is very peculiar, consisting of hundreds of species of very unstable nature.

Genus Microdon species Serres

Geognosie des Terrains Tertiaires, p. 253, (1829).

Serres stated that this fly closely approached the species *Aphritis auropubescens* described by Latreille.

Locality: Aix, Provence, France. Horizon: Oligocene.

Type: I was not able to locate the place of deposition.

The Subfamily ERISTALINAE

Four genera are assigned here. At least two, possibly three or even all of the genera are very questionable.

a. *Helophilus primarius* Germar. This record should be deleted, in my opinion, from the family. I can not see that there is the slightest reason for placing this fly in *Helophilus*. I did not locate the type.

b. *Merodon germari* Heyden. I located this type in the British Museum. It is extremely interesting and the body and legs beyond doubt suggest *Eristalis*, but even when discovered the wing was insufficiently preserved to say that it should definitely go into the Eristalinae. To definitely place a fly in the subfamily Eristalinae, we must rely on the third vein being kinked, because if it were not (and it fortunately is in over seven hundred species which are in about sixty genera and subgenera) we should have to fall back, in present knowledge, on the basal femoral patches of setae, a character that varies to some extent. Besides the kinked vein, it is true that the Eristalinae almost always possess very robust abdomens and often large squamae, but we can hardly define the subfamily in these terms. The ancestry of Eristalinae is too poorly known for us to conjecture much upon its origin. Their face is nearly always tuberculate, only three of many genera excepted, and the origin of both of these, as well as the Sericomyinae is obscure. I believe that through *Mallota*, *Brachypalpus* and *Criorrhina* and even better through *Sericomyia*, we find a certain amount of closeness which is more than resemblance. This points vaguely to a relationship with Xylotinae but at an extremely early period, because most true Xylotinae have the opposite type of face. It is significant that plumose aristae are restricted (one exception in Cheilosiinae) to Eristalinae (a few genera), Volucellinae (all genera) and in Sericomyinae (all genera). We have seen that the Volucella-form existed complete, except for the wing, in the lower Oligocene.

c. Scudder described *Eristalis lapideus* from Green River, Wyoming, but Williston, who saw the specimen, did not believe it was an *Eristalis*. Since the type is now lost, we will have to wait until it is again found to know its real affinities. Williston was almost certainly right in assigning it elsewhere.

d. *Palaeoeristalis tessellatus*, new genus and species (described below). I place this species in an Eristalinae genus on the basis of the short rotund abdomen and the slight curvature of the third vein. Since it is poorly preserved, this is all that I can discover of significance. There are other genera (non-Eristalinae) with the third vein shallowly

dipped. This is quite possibly an early type of *Eristalis* in which the third vein has not yet become deeply and definitely kinked.

Helophilus villeneuvi Thèobald

Les insectes fossiles des terraines oligocines de France, 1937, p. 351; pl. 7, fig. 12.

Length 12 mm. *Head:* large, as wide as the thorax, semicircular in shape. The eyes do not quite touch. The vertical triangle is large, the front short, the posterior border of the head almost straight. The ocelli and antennae not visible. *Thorax:* black, oval and strongly pubescent. *Abdomen:* wider and longer than the thorax, compressed and ovoid; black in color with clear spots on the borders and clear transverse bands. *Legs:* wanting. *Wings:* long and over-reaching the extremity of the abdomen. The venation is obscure but the costa, subcosta and radial sector veins can be distinguished. The radial sector is bifurcated. The longitudinal fold of the vena spuria can be discerned.

The author places this insect in *Helophilus* largely upon the basis of size, compact shape and an abdominal pattern somewhat similar to that of *Helophilus quadrivittatus* Wied. He states further that the first, second, third and fourth segments of *villeneuvei* carry the clear lateral spots; the fifth carries besides a transverse clear band.

The olose approximation of the eyes suggests the genus *Mesembrius* instead of *Helophilus;* the marked pubescence of the thorax might indicate *Mallota* or some subgenus of this group. There are considerable number of closely related subgenera in the Helophilini.

Locality: Aix-en-Provence, France. Horizon: Oligocene.

Type: L'Ecole des Mines de Paris.

Helophilus miocaenicus (Stackelberg)

Tubifera miocaenica Stackelberg, Revue Russe d'Ent., **19**, p. 89–90, Taf. II (1925).

This species was described by Stackelberg from the Middle Miocene of Voroshilovsk, Caucasia. His description is accompanied by an excellent photograph which shows clearly much of the venation of the wing and shows the pattern of the abdomen well. This pattern with its large, paired, pale spots, almost touching, and black posterior borders is not greatly dissimilar to that of *pendulus* Linnaeus, a Recent species. The character of the venation clearly places the fly in the

subfamily Eristalinae. The loop of the third vein is deep and evident. The marginal cell appears to be open as is required in the genus *Helophilus*. The description is not quoted here in as much as it will be necessary for the student to refer to the original illustration.

Merodon germari Heyden

Plate 5, fig. 26; Plate 8, fig. 60

Palaeontographica, **78**: 10; fig. 5 (1862)

Size quite large. *Head:* very large and not so wide as humeri, somewhat shallow, but it is not long. Eyes touching, mid-line facets not enlarged, occipital eye margin seen from above laterally sharp and with two little borders as far as can be ascertained. *Thorax:* broad, robust, black in color. Scutellum cannot be made out clearly, but appears to have been about one and three-fourths times as broad as long. Thorax short, pilose. *Abdomen:* broad, slightly emarginate, with two distinct black patterns with markings sharp and not cloudy on edges. Posterior margin overrun with post bristles, long and sharp. Pattern as follows: a black posterior border on second segment, widening toward sides and produced as a median stripe, until it reaches the margin of the first segment, where it spreads out narrowly. Second segment with much wider posterior margin, only very narrowly wider laterally, with similar median stripe reaching second segment and not spreading out as it does so. Third and fourth segment with a similar band. Fifth appears to have been entirely dark. Hypopygium small. *Legs:* hind femora very thick, but not greatly thickened out of proportion to the size. There is some evidence of a few setigerous bristles apicoventrally on the hind femora. Hind femora thickly covered with short sharp, slender bristles. Hind tibiae similarly covered. *Wings:* poorly preserved. Base with a few short sharp spinules. Size and patern resembling that of a species of *Milesia*.

Locality: Rott, Germany. Horizon: Upper Oligocene.

Holotype: British Museum of Natural History; the type was studied.

Genus Palaeoeristalis genus nov.

Head: hemispherical. *Thorax:* short and broad. Scutellum one and three fourths broader than long. *Abdomen:* quite robust and short. Five segments can be seen. The abdomen is broadly rounded past the second segment and evidently quite convex. *Legs:* hind femora very much thickened, the thickening spread more or less over the whole

length but a little greater basally. Ventro-distally the femora is equipped with many small setae rather than spines. *Wings:* with the third longitudinal vein gently curved down into the first posterior cell. The apical cross vein joins the third vein not far from the tip of the wing; it is sinuous. The lower cross vein is near to the margin of the wing and more or less parallels it. Third vein ending near tip of wing.

Genotype: *Palaeoeristalis tesselatus* spec. nov.

Palaeoeristalis tesselatus spec. nov.

Plate 4, Fig. 7–9

Head: hemispherical with detail apparent. *Thorax:* short and broad. No pile can be seen, nor any bristles. Scutellum about one and three-fourths times as broad as long, rather square in outlines, with simple margin. *Abdomen:* five visible segments; form broad and rounded. Second segment two and one-half times as broad as long, third twice as broad as long, and the remaining two, short, evenly rounded off. Abdomen indistinctly marked but the second and third segments have each a wide posterior border dark in color, which is slightly and gradually widened as it approaches the lateral margin, and which medially interrupts the anterior pale band in a rather broad fashion. The margin of the spots are vague and not sharply delineated. The color is darkest along the median line. The fourth and fifth segments more or less wholly dark. Posterior halves of second and third segments, especially the dark areas, and the terminal segments covered with short, quite thickly set, bristle-like hair, which in the middle is directed posteriorwards and on either side obliquely towards the lateral margins. *Legs:* one hind femora shows as a pale enormously thickened structure with many sharp black setae on the ventral distal two-thirds. The hind tibiae are long. *Wings:* poorly preserved. Marginal cell open. Anterior cross vein joining discal cell way beyond middle, somewhat drawn out in oblique fashion but not markedly so. Subapical cross vein apparently angulated. Costa microsetose. Third longitudinal vein with a decided flexure without in the least being kinked.

Locality: Dragon, Utah. Horizon: Eocene.

Holotype: no. 3948 in the Museum of Comparative Zoölogy, (F. M. Carpenter, collector).

This is a remarkably interesting form. With its small size, broad round abdomen, thickened femora, it suggests chiefly an *Eristalis*. Present day *Eristalis* must have a kinked third longitudinal vein.

Eristalis paucisinuatus Thèobald

Les insectes familes des terraines oligocènes de France, 1937, p. 352; pl. 23; fig. 12.

Length 11.5 mm. *Head:* large and transverse; the facettes of the two large eyes are visible, they appear to touch on the front. The anteriorly produced antennae have a pointed arista which is not plumose. *Thorax:* large, black, finely hairy with numerous bristle. Scutellum large and rounded. *Abdomen:* oval, rounded at the extremity with four segments visible. The pattern of the abdomen suggests slightly that of *Eristalis solitus* Walker; the pattern of the second and third segments especially differing. *Legs:* at least the hind femora swollen and enlarged and hairy. *Wings:* the wings lie folded upon the abdomen; almost all the venation is visible. The vena spuria is clearly visible. There is a curve in the third longitudinal vein which is not so deep as that in *E. solitus* Walker.

This fly would appear to be a satisfactory example of the Eristalinae. The more gently curved third longitudinal vein is a matter of special interest as in all Recent members of this subfamily this vein is rather deeply kinked.

Locality: Aix en Provènce, France. Horizon: Oligocene.

Type: No. 1005, Thèobald collection.

The Subfamily VOLUCELLINAE

The Volucellinae is one of the dominant Recent types of Syrphidae; its species are preeminently characteristic of the Neotropical Region. Very few fossil flies have been associated with this subfamily. Loew mentioned an undetermined specimen from the Baltic amber which he assigned to *Volucella*. The only other instance is the unique new genus *Ptilocephala* from the amber. It is clearly *Volucella*-like in eight particulars.

Genus Ptilocephala genus nov.

Head: small. Eyes large and flattened, the front especially steep, oblique, flattened and concave, but a little bit convex before the antennae. Antennae situated three-fourths of the way up from the bottom of the head and at the junction of the middle and upper thirds of the eyes. First two joints short, third joint elongate, three or four times longer than wide. The arista a little longer than antennae, plumose with twenty rays above and with many shorter ones below.

The head below the antennae very flat, not produced near the bottom of the eyes, the face is abruptly and conspicuously produced into a rounded and protuberant knob or tubercle which is beset with long bristles. Below the tubercle the face recedes gently and then drops vertically for a considerably greater distance. *Thorax:* with stiff macrochaetae along the margin and on the margin of the scutellum. Scutellum with an oval concave depression on the disc. *Abdomen:* short, appressed setose. *Legs:* hind femora short, somewhat thickened in the middle, and spread out over the whole length. Tibiae very short and thickened on the distal two-thirds and about three-fourths as long as femora. Details of the ventral surface of femora cannot be ascertained. *Wings:* large, but short and broad, a little longer than the abdomen, broadest basally, and but little less broad toward the apex. The vena spuria faint, but present. Alulae well developed. Stigma pale. Costal cell very wide, the costa with a double row of unusually heavy, long, erect, sharp-pointed microspinulae; the lower marginal cross vein straight, directed away from wing margin. Spurs of fourth and fifth longitudinal vein very short or absent, the apical cross vein sinuous, joining the third vein at right angles but not recurrent some distances from tip of wing but not remotely.

Genotype: *Ptilocephala volucelloides* spec. nov.

This genus is unique in many ways, and is the only certain fossil member of the subfamily *Volucellinae*. Loew mentioned having seen a species of the *Volucella* from the amber, but he did not describe it or assign any number to it. I have studied all the Syrphids mentioned by him except the *Volucella*, which I did not find at the British Museum with his other specimens. The present species forms a true connecting link between the Cheilosinae and Volucellinae because it has the venation not greatly different from *Cheilosia* and the tuberculate face, and the chaetae of *Cheilosia* and has the plumose arista of *Endoiasiamyia* (*Hiatomyia*). Indeed, when I first thoroughly examined the specimen I considered it to belong to this genus. However, the knobbed, bristly, tuberculous, deep conical face, the macrochaetae are all characters which are strongly *Volucella*-like and the facies of the insect is more like that of *Volucella* than it is of *Cheilosia*. Lastly, were the apical cross vein recurrent and did the third vein join costa far above tip of wing one would have practically transformed it into a modern *Volucella*-like type. The depression on the scutellum reminds one of *Phalacromyia* but it is much more like that of *Graptomyza* and the faint vena spuria and the concave flattened front also suggests this genus. It is a peculiar and interesting fly, which is clearly Volu-

cella-like in eight particulars; the wing however is but little suggestive of *Volucella*. Has body-type here, as in *Xylotosyrphus* been laid down before wing shift? Or is this but an aberrant off-shoot? I do not see how the former conclusion is to be avoided. *Ptilocephala* combines some of the characters of the most specialized and of the most simple genera of the Volucellinae.

Ptilocephala volucelloides spec. nov.

Plate 6, fig. 31–35

Female. Length 4.8 mm.; length of wings 4.6 mm. *Head:* broader than thorax. Eyes large, flattened, widely separated in the female, the top of the head obliquely flattened as in certain species of *Volucella* or *Graptomyza*. The front between the ocelli and the slightly convex portion just above the antennae is shallow, concave, and flat and erect sparse pilose. Antennae situated about three-fourths of the way up from the bottom of the head or nearly at the junction of the upper and middle third of the eyes. Antennae elongate, the first two joints short, the third joint three and one-half to four times as long as wide, dark brownish black in color. The arista barely longer than antennae, strongly thickened basally and long stiffly plumose above and below, the upper basal rays the longest. About twenty rays on each side. Face below the antennae in profile apparently flat with the level of the eyes, then a short distance from the level of the bottom of the eyes strongly and abruptly produced out as a rounded blackish bristle-beset knob, which is very protuberant, rounded, and below which the face continues to drop, after a brief recession, for some distance. Cheeks not very conspicuous, the actual epistomal-cheek-occipital profile is obscured by exuvia. Presumably the face is sharply conical and the oral profile concave. *Thorax:* convex, with two stiff bristles on the side before the wing, two above the wing, two on the mesopleura, three on the posterior calli, one bristle on each side before the scutellum and a little bit to the outside. Scutellar margin with three pairs of bristles, all of which are exceedingly stout and thick. Pronotum of thorax with a collar of short stiff bristles. Scutellum with the disc broadly and symmetrically flattened and concave, the margin of the concavity lined with bristles and a very few bristles on the concavity. The scutellum suggests that of *Graptomyza flavorhyncha* Hull in the matter of this oval concavity. *Abdomen:* short, broad, a little longer than wide, black in color; as far as can be discerned, with thick short appressed bristles. Much of the abdomen is hidden and obscured by

the wings. *Legs:* hind femora a little bit thickened in the middle, short, the color obscure but mostly dark. *Wings:* light brownish, stigma a little darker.

Locality: Baltic amber, Germany. Horizon: Lower Oligocene.

Holotype: in the University Museum of Konigsberg (No. X 118).

Volucella species Loew

Ueber den Bernstein und die Bernsteinfauna Meseritz Progr. k. real schule p. 1–48. (1850)

The dipterist Loew mentioned having seen a specimen of this genus preserved in amber but he gave no name to it. The specimen should be in the British Museum, but I was not able to locate it among the other material examined there.

The Subfamily XYLOTINAE

Two genera have been assigned here by name without numerical or species designation. They are *Criorrhina* Giebel and *Tropidia* Handlirsch. I was privileged to search through the collection of the late Dr. Handlirsch in Vienna, but without finding the *Tropidia.* I have been unable to trace Giebel's collection. *Tropidia,* to occur in the modern sense, must have a megamorphic femora, a femoral plate and carinate face.

Xylotosyrphus is to be doubtfully placed here. It has all that Xylotinae should have except a definitely post basal small cross vein. It is an early type, connecting through the *Myioleptini,* the *Cheilosinae* and Xylotinae.

Megaxylota is a large and beautiful fly from the amber. It is a true Xylotinae in every respect, and is not unlike, in some ways, *Brachypalpus* or *Calliprobola.*

Genus Criorrhina species Giebel

Zietschr. Geol. Nat., **2**: 87 (1870)

There is considerable uncertainty whether this genus occurs in the Baltic amber. Whether Giebel was dealing with such a species or not is uncertain, because in his brief remarks he compares the fly to a *Dolichopodid,* and of course no *Criorrhina* could be anything like this. It will be necessary to wait until the type is located to determine the matter.

Genus Xylotosyrphus genus nov.

Head: more or less destroyed, about as wide as thorax. *Thorax.* long and broad, somewhat convex, dark in color, without pattern. The scutellum one and one-half times as wide as long, with simple semi-circular rim. *Abdomen:* two to two and a half times as long as wide with prominent rounded hypopygium and the sides of the abdomen nearly parallel. Abdomen marked with two pairs of prominent, subquadrate, pale spots on second and third segments. *Legs:* hind femora considerably thickened. *Wings:* with venation more or less like that of *Xylota* but the small cross vein definitely basal in position and entering the discal cell less than half of the way from the base.

Genotype: *Xylotosyrphus pulchrafenestra* spec. nov.

This genus seems to be in every respect like certain species of present day *Xylota*, except that the small cross vein is definitely well before the middle of the discal cell and in our modern scheme of things this would preclude placing it in the Xylotinae. Consequently many things such as general body form and pattern have a more ancient history than the relative position of the small cross vein, long relied upon as an important index of relationship. It may be that more fully preserved specimens will later show other differences between *Xylotosyrphus* and present day *Xylotas.*

Xylotosyrphus pulchrafenestra spec. nov.

Plate 4, fig. 12

Male. Length 10 mm. Width of abdomen 2.7 mm. Length of wing indeterminate (about 6.8 mm.).

Head: the head shows little detail. Part of the head past the occiput being destroyed. *Thorax:* stout, broad, and relatively short in profile with a gently forward downward slope from the middle. Scutellum rather small, evenly rounded. *Abdomen:* the sides of the abdomen are parallel, with a beautifully rounded (hemicircular) tip, suggestive of the hypopygium of the male. Five segments visible. Abdomen marked with four pale quadrate windows, a pair each on the second and third segments, each of these segments is divided by a median black stripe and the anterior median corners of the second pair of spots and the post median corners of the first pair of spots are markedly rounded and convex, leaving the black concave. Remaining segments and hypopygium dark in color. Abdomen largely covered with extremely short, thick, decumbent, black, bristly pile. *Legs:* hind femora

considerably thickened, greatest in the middle or just past the middle; in length about three times as long as greatest width. Remaining femora slightly thickened. Hind femora with numerous stiff black spinules ventrodistally. The hind tibiae appears to have been spinulose basi-ventrally. No further details of the legs can be seen. *Wings:* very little shows. In one specimen it can be ascertained that the anterior cross vein is beyond the middle of the discal cell and is pulled down distally to an oblique angle. Morover, the terminal section of the fourth longitudinal vein as it joins the postical cross vein, is strongly curved downward or deflected. It joins at an angle of some sixty or seventy degrees. Marginal cell open.

Two beautiful specimens which show, as far as can be ascertained, all the characteristics of our modern *Xylota*. It is impossible to ascertain whether they would come in the neotropical *Planes*, which is a *Xylota* with carinate face.

Locality: Dragon, Utah. Horizon: Eocene

Holotype: No. 3942 in the Museum of Comparative Zoölogy (F. M. Carpenter, Collector.)

Paratype: one specimen, with the obverse and reverse, Nos. 3943 and 3944, in the Museum of Comparative Zoölogy.

Genus Megaxylota genus nov.

Head: large and broader than thorax, rather wide and not particularly elongate. The females are broadly dichoptic. The front convex, somewhat protuberant, the antennae situated a little below the middle of the head in profile; short; third joint large, a little longer than broad; rounded. The arista quite long and slender. Face below antennae deeply concave; the epistoma thrust forward at face itself, short, it is but little more produced at junction of face and cheek and not angularly ridged. Occiput scarcely visible in profile from above, the back of the head is gently convex and the flanges on the lower part of the occiput behind head are conspicuous. *Thorax:* half again longer than wide, quite convex, short, dense, erect pilose. Scutellum not large, convex on the rim, flattened on the disc, the apex subtruncate, the margin with a few long slender bristles. *Abdomen:* a little over twice as long as wide and a little bit convex, especially terminally, broadest in the middle, not greatly tapering towards the end. *Legs:* hind femora very massive, especially on the basal three-fourths, rather narrowed apically, the ventral part of the hind femora with a slight bulge shortly before the end and beset with many rather short stiff

bristles, but no spines. Hind tibiae very short, only three-fifths as long as femora, thickened throughout, very arcuate, ending transversely. *Wings:* elongate, pointed apically, broadest basally. The small cross vein is very oblique; it joins the discal cell about three-fifths of the way from base. Wings *Xylota*-like in venation. Marginal angles of the marginal cells spurred, apical cross vein sigmoid, joining the third vein not very far from the end of the wing. Vena spuria prominent. Alulae present.

Genotype: *Megaxylota magnifemur* spec. nov.

These are large flies. This genus differs principally from *Xylota* in the grossly thickened femora, which unlike *Xylota* lacks completely all spines on the femora. The very short, quite arcuate transverse-ending tibia is characteristic.

Megaxylota magnifemur spec. nov.

Plate 7, fig. 40–42; Plate 8, fig. 52–53

Female. Length 16 mm.; length of wing, 10 mm. *Head:* broad, eyes apparently bare, the ocelli but little protuberant. The pile of the front very short but dense and apparently restricted to the upper half, indicating that the front of the male is pubescent only. Face and front as nearly as can be ascertained under the whitish exuvia, dark in color. Face pubescent only, the facial strips fairly wide and conspicuous and with a fringe of hairs. Cheeks near the occiput with some long hairs and the pile of the occiput throughout is thick, though not very long. No spines near the top. Occiput broadly rounded near the margin. Humeri and pleura densely pilose. *Thorax:* the pile of thorax and scutellum seems to be pale in color throughout. Scutellum black, the posterior calli brownish orange and due to the exuvia it is impossible to tell the color of the mesonotum or of the abdomen. *Legs:* the femora seem to have been orange brown, somewhat lighter apically, and the tibiae and tarsi were beyond question light in color. *Wings:* are somewhat matted to the abdomen and also coated and while the venation shows well, the abdomen is somewhat obscured. Wings were pale yellowish brown in color.

Locality: Baltic amber, Germany. Horizon: Lower Oligocene.

Holotype: in the University Museum at Konigsberg. This specimen bears no number; the slide is numbered 'D'. I affix the number H 105.

Genus Tropidia species

Handlirsch, Handbuch Palaeont. und Zool. **4** (2): 1024 (1908)

The genus *Tropidia* is a fairly well marked and characteristic genus, but I cannot say definitely whether or not Handlirsch was sufficiently familiar with the genus to recognize it. Consequently it must await further study. I was unable to locate the specimen in Handlirsch's collection in Vienna. He gave no specific name to the specimen.

INCERTAE SEDIS

Syrphus curvipetiolatus Meunier

Jahrb. Preuss. Landesanst. **24**: 210, pl. 13, fig. 8, 9 (1904)

Male. Length of body: 7.5 mm.; length of wings 4.5 ? mm. *Head:* oral margin is conspicuous. Facial tubercle not distinguishable. Antennae small. Eyes touching on the front. The first two segments on the antennae short, the third rounded off, the antennal arista moderately short and thick. *Thorax:* scutellum black, faint, hairy. *Abdomen:* transparent. It is impossible to discern whether it has bands or stripes as in Recent forms. *Legs:* claws large, bent. Pulvilla strongly developed. *Wings:* this form is characterized by a very short appendicular vein proceeding to the posterior cell, which is always clearly evident in Recent species of *Syrphus.* (Translated and rearranged from the original).

Locality: Baltic, Germany. Horizon: Oligocene.

Type: No. 4445 from the Kgl. Bernstein collection at Konigsberg. (not seen).

This is the only species described by Meunier of which I was not able to find the type or a specimen. This fly apparently does not belong to the genus *Syrphus.* The type must be examined before it can be definitely determined to what genus it belongs.

Syrphus bremii Heer

Die Urwelt der Schweiz, fig. 314 (1865)

The note below is the only comment that Heer makes about this species and *Syrphus shellenbergi,* which he figures.

"The hoverflies (Syrphiden), however, are in two forms, which are marked as in the living species with their pretty banded abdomens (Fig. 314 and 315)."

This species may be recognized by the narrow black bands on the

base of the third and fourth segments, each broadly interrupted in the middle, and the large flat triangle in the middle of the second segment. This maculation makes it unique and easily recognizable, but as it is characteristic for certain Stratiomyids and as the wings in this fossil fly seem to have been very imperfectly preserved, there is a considerable possibility that *Syrphus bremii* is a *Stratiomyid.*

Locality: Oeningen, Germany. Horizon: Miocene.

Type: Not located.

Syrphus schellenbergi Heer

Die Urwelt der Schweiz, fig. 315 (1865)

See the comments under *Syrphus bremii.* Characterized by the fact that all of the second, third, fourth and fifth segments are solid black on all the central portions; narrowly margined everywhere with pale color.

Locality: Oeningen, Germany. Horizon: Miocene.

Type: Not located.

Helophilus? primarius Germar

Insekt. Protog ae. Spec., Fasc. 19: 25, pl. 25 (1837). Giebel. Fauna der Vorwelt. Die Insecten und spinnen der Vorwelt, **2**: 201 (1856)

This species is unrecognizable from the description and figures.

Locality: Bonn, Germany. Horizon: Oligocene.

Type: Not located.

Eristalis lapideus Scudder

Bull. U. S. Geol. Geogr. Surv. Terr., **3** (4): 756 (1877). Tert. Ins. sp. 558 pl. 5. fig. 48. (1890). Williston, Synopsis N. A. Syrph., p. 281–283 (1886)

The following comments based upon Scudder's description are pertinent.

Length of thorax 3.5 mm.; breadth of thorax 3.5 mm. The specimen was poorly preserved but fixed in dorsal aspect with the wings partly expanded. The head was almost wanting and the thorax without markings. The abdomen was long, broadest in the middle of the basal half and posteriorly tapering considerably; the tip of abdomen was rounded. The apical half of the first segment was black and formed a distinct transverse fascia. There appeared to be five segments. The venation of the wings shows only upon the basal half of the wing and

there poorly; the alula was distinct and quite large with oblique, dark, transverse ridges indicative Scudder says of *Volucella* or *Oestrus*.

Locality: Chagrin Valley, White River, Colorado (W. Denton). Horizon: Eocene.

Type: one specimen. I was not able to locate the type.

It is rather doubtful if this fly belonged to *Eristalis* but a better specimen is required for a decision as to its affinities. Williston, who also doubted its affinity with *Eristalis*, stated, "Of the thirty or more species which Mr. Scudder had separated out, I was first struck with the fact that probably all belong to the first division of the family with a basal cross-vein, a conclusion at which Mr. Scudder had already, independently, arrived. There are two possible exceptions to this rule, but both of them are doubtful, in view of the general relationships of the other material studied. The first possible exception is the specimen which Mr. Scudder had doubtfully referred to *Eristalis*."

Insects Misidentified as SYRPHIDAE

Several names have in the past been associated with the family Syrphidae, but do not belong there. These are briefly mentioned below.

Cheilosia dubia Weyenbergh

Archives du Musée Teyler, **2**: 259 (1869)

Cheilosia dubia Weyenbergh should be deleted from the list of fossil Syrphidae. I quote from a recent letter of Dr. E. Dubois of the Teyler Museum, who had a photograph made of it recently:

"The imprint is very ill-defined. In my opinion and that of one of my palaeontological pupils, specialized as an entomologist, it only shows to be of an insect. We can understand that Handlirsch says of it, 'Ist sicher kein *Cheilosia* und keine Syrphide und vermütlich überhangs kein Dipteren'."

Psilota tabidosa Scudder

Tert. Ins., **13**: 561 pl. 9, fig. 9 (1890)

Length 5.0 mm.; wing 3.9 mm.; abdomen 3.8 mm.

The type of this species has been examined (Mus. Comp. Zoöl.). It consists of a body, one wing and a very imperfectly preserved head and thorax that must necessarily be completely disregarded. The venation is obscure. Nevertheless, certain portions show tolerably

clearly. Everything considered, the size, shape of body and wing, and the apparently six or seven segmented body and venation remove this fly from any possible location in the Syrphidae. It has in a strong degree the habitus of a Scenopinid or window fly. It must be noted that, while the apparent segmental lines of the abdomen may not all be true segmental divisions, still there are no Syrphids known with such additional creases midway between segments. If the specimen is viewed as a Syrphid the rounded nodose termination of the abdomen would be equivalent to a hypopygium; thus the specimen would be a male and limited to five segments. I believe, the species must be removed from the Syrphidae, perhaps placed in the Scenopinidae.

Remalia sphinx Brodie

Hist. fossil insects second. rocks England. 1845

This species was wrongly included in the Syrphidae. A glance at the original pagination and subtitles will show that it was originally described by Giebel (1856) under the family Muscidae, Brodie (1845) having listed it only.

Syrphopsis globosiceps Zeuner

Fortschr. Geol. Paleont. **11** (28): 316 (1931)

This species is based on a very insufficient specimen. I can make nothing of it from my examination of the type specimen, and see no basis for including it among the Syrphidae.

CONCLUSIONS

This study of fossil Syrphid flies warrants consideration along three different lines:

1. A general consideration of the relationship of fossil genera, species, and individuals to the Recent fauna and the origin of the family.
2. Special evidence afforded as to morphological changes.
3. Evidence afforded as to variation of species.

A table is presented below, showing the species and genera of fossil Syrphids placed in their respective horizons. It shows that the largest number of species and genera, so far as yet discovered, occur in the Oligocene. This is certainly due to the abundance of this family in the Baltic amber (Lower Oligocene), for there are fourteen extinct genera

in this period and only five Recent ones, as compared with three extinct (possibly only two) genera and eight Recent genera in the Miocene. These figures point to a rapid process of elimination of generic types in the Lower Oligocene and a consequent period of marked transition of extinct genera to more Recent ones. Wheeler (1914) found a somewhat similar situation, when summarizing his conclusions from a study of the ants of the Baltic amber; no data are afforded as to the number of extinct genera of Miocene ants, but he notes that forty-four percent of the Lower Oligocene ant types do not appear in the Recent fauna. Wheeler further notes that Ulmer, in his study of amber Trichoptera, finds forty-six and four-tenths per cent extinct genera. Carpenter (1930) finds that forty percent of the Miocene (Florissant) genera of ants are extinct types. The percentages for Lower and Upper Oligocene and for Miocene are contrasted in the table below.

It will be seen that there is a general elimination of generic types in several groups of insects throughout this period although the extent of this elimination varies somewhat.

Lower Oligocene Amber Syrphidae	Lower Oligocene Amber Ants (Wheeler)	Lower Oligocene Amber Tipulidae	Upper Oligocene Syrphidae	Miocene Syrphidae
19 genera	43 genera	38 genera	6 genera	11 genera
14 extinct	19 extinct	9 extinct	0 extinct	3 extinct
74% "	44% "	24.% "		27% "

I am strongly inclined to believe that when *Syrphus curvipetiolatus* Meunier, the Criorrhina of Giebel, and the *Tropidia* of Handlirsch, the only modern genera remaining in the amber list except *Cheilosia* and *Myiolepta,* are located and studied, they will also prove to belong at least to extinct subgenera. Should this prove correct, the amber Syrphid fauna would consist of over ninety percent extinct forms, and we would be able to say that their extinction proceeded almost twice as fast as that of ants and Trichoptera, as far as this period is concerned.

We can hardly say definitely whether a total of one hundred and fifty to two hundred specimens of amber Syrphids, out of a total number of amber specimens of insects exceeding one hundred thousand and perhaps as much as one hundred and fifty thousand, is an indication of individual abundance or paucity. We know that in some communities today the Syrphid fauna is particularly rich, but almost no

satisfactory logical work has been done upon individual and species population. Mr. Charles Johnson reported finding as many as one hundred and eighteen species in one spot in New England, but this is certainly exceptional. Williston reported taking in a few days from one group of elderberry bushes as many as forty-seven species. The highest list of species from a state is perhaps that of New Jersey with about two hundred species, to which others have been added since.

As for the records of fossil species, we are safe in saying that considerable morphogenesis was taking place among Syrphids as far back as the Lower Oligocene, and almost surely extending back well into the Eocene, since at least six of the seven principal subfamilies had already differentiated by this time. A study of Recent types would indicate that the Syrphinae and Cheilosinae are the most generalized groups among the fourteen subfamilies. Obviously, the fossil record supports this conclusion. In a certain sense the Syrphinae represented the offshoot from which most of the plain and patterned Syrphids arose, and the Cheilosiinae, with their characteristic melanic coloring, are certainly the ancestors of the Xylotinae and the Callicerinae. In these last two subfamilies the dark or aeneous coloration becomes the commonplace, and so perhaps they are ancestral to all of these melanoid and aeneous types. Many Syrphid genera secondarily acquire a paler appearance owing to the strong development of light yellow pile and pale, even silvery pubescence. One is tempted to believe that the possible desirability of pale coloration provides an explanation for the abundance of the sheen-like pubescence and pollen of many forms; nevertheless, this is conjecture.

It seems fairly certain, in view of the decided differentiation of the two main subfamilies in the Eocene, as well as the beginnings surely of two others, that the Syrphidae originated sometime in the late Cretaceous. The flora of this period, containing as it did *Platanus, Fagus, Quercus, Viburnum, Liriodendron, Acer, Liquidamber*, etc., in short many recent deciduous types of shrubs and trees, might easily have furnished food for Syrphids, for these flowers are highly polliniferous, and they are the genera today upon which we often find Syrphid flies, albeit there is now a distinct preference for definitely white rather than colored blossoms. It is not wholly improbable that the origin of the Syrphidae goes even farther back in time, for positively identified Tipulidae and even some higher Diptera have been found in the Jurassic.

Lastly, I think it is of interest to note that at least one very prominent Oligocene branch was highly developed in a structural sense, and

leaves not even a modified descendant today. This is the group of genera and species centering around *Palaeosphegina* and including *Palaeoascia* and *Pseudosphegina*.

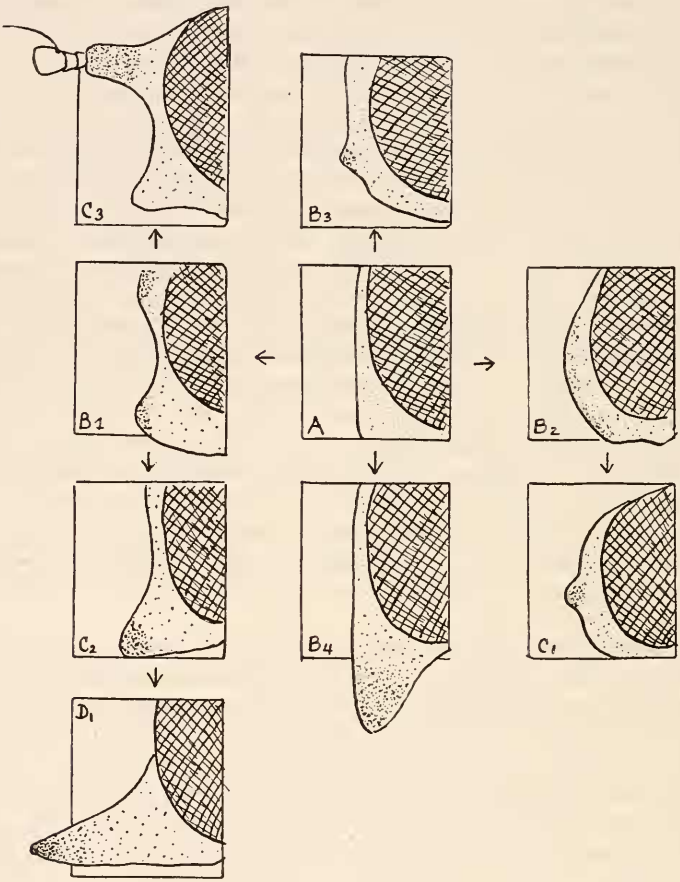

Fig. 2

2. There are two great fossil face types (middle face only considered), the tuberculate-faced flies and the epistomally produced flies. We have the choice of regarding one or the other as the more generalized. The question has particular significance if we wish prop-

erly to evaluate forms in Syrphid flies, and quite important in other families of Diptera. It seems to me that the evidence is in favor of the idea that the epistomal face is more specialized. The text figures given below illustrate the principal fossil types of face in Syrphid flies.

The following points can be urged as evidence in favor of regarding the epistomal face as more specialized:

(a) In that subfamily (Xylotinae) to which, excepting the Cerioidinae, we accord much the highest specialization, the definitely concave, "epistomal-thrust-face" is the predominant type; facial tubercles are quite scarce. Moreover, that subfamily contains very many forms with the produced front, which as an antennal prominence, necessarily borrows from the face, and which according to the concept outlined in the text figure must be derived from this same concave type. Also, the Cerioidinae, the last and most specialized subfamily, is wholly made up of such forms; the upper part of their faces is well thrust forward, although the oral margin may be slightly retreating. Since these two very specialized subfamilies contain so many derivatives of the concave face, it seems to indicate that such a face is more specialized than the convex, tubercle type. Doubtless both concave and convex face types have arisen from a more or less straight type of face as shown in text figure 2.

(b). The two lowest subfamilies on the basis of wing development, usually have a recessive epistomal (convexo-tuberculate) face.

The Oligocene types then, were more specialized in eyes and more generalized in face. The specialized acquisition of holoptic eyes has occurred many times in many families, and this acquisition should not have been difficult. At least eighty percent of Syrphid genera are holoptic. The well-known dipterist, Osten Sacken, has adduced some interesting correlations between pedestrian habits and dichopticism, and the aerial habit with its associated holopticism. In the main his views seem to be well warranted, but the exceptions of which he speaks are still largely exceptions. He is wrong in classifying *Sphegina* and *Neoascia* with the aerial flies.

(c). A very few genera have carried epistomal development to an extreme (*Rhingia, Rhinobaccha, Graptomyza, Lycastris, Lycastrirrhyncha*). I do not see how we are to avoid the contention that these are among the most specialized members of the family. Since this is a further specialization of the epistoma, it seems to me to indicate that the concave face is more specialized.

3. Concerning individual variation in fossil Syrphids, I would like to point out that *Palaeosphegina* is of peculiar interest because it displays

such a medley of variations. Out of the total of thirty-three specimens (almost twenty-five per cent of all of the amber material studied) this genus shows wide variation in many particulars, varying as much or more than one hundred per cent; it is much more variable than the closely related *Palæoascia*. This latter genus comprises an even greater percentage of my material. The material on hand in *Palaeosphegina*, may possibly represent variations produced over quite a long period of time. This may account for such a striking lot of variations in a small number of specimens, but regardless of how we account for it, the genetic pattern was evidently a highly unstable one. This genus barely differs from modern *Sphegina*, except in two points, the tuberculate face and holoptic males. That means that its legs, wings, abdomen and thorax are practically what we find in modern *Sphegina*. *Palaeosphegina* however, cannot bear the slightest connection with *Sphegina* because of its specialization in the matter of the eyes. The American species of *Sphegina* are sharply and definitely distinct, the individuals of any one species highly stable, showing as a rule, only one or two percent variation in any particular character.

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